City of Carlsbad
New Mexico

Wastewater Treatment Facility
Effluent Reuse
Preliminary Engineering Report

HDR | ONE COMPANY *Many Solutions*℠

July 2014

City of Carlsbad

New Mexico

Wastewater Treatment Facility

Effluent Reuse

Preliminary Engineering Report

Prepared by

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HDR Project No. 291625

July 2014

ENGINEER'S CERTIFICATION

I, Wade M. Chacon, certify that I am a licensed Professional Engineer registered in the State of New Mexico (PE #17857), and that this document was prepared by me or under my direction.

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Wade M. Chacon

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Abbreviations and Terminology

af	Acre-Feet
af/yr	Acre-Feet per Year
City	City of Carlsbad
EPA	Environmental Protection Agency
gal	Gallon
gpm	Gallons per Minute
HDPE	High Density Polyethylene
HDR	HDR Engineering, Inc.
LS	Lift Station
MG	Million Gallons
mg/L	Milligrams per liter
mgd	Millions of gallons per day
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OSE	Office of the State Engineer
PS	Pump Station
psi	Pounds per Square Inch
PCCP	Prestressed Concrete Cylinder Pipe
PVC	Polyvinyl Chloride
TDH	Total Dynamic Head
WWTF	Wastewater Treatment Facility

When dealing with irrigation and land application, water quantities are generally expressed in terms of acre-feet, which can be defined as an area of 1 acre with a depth of 1 foot of water. In terms of the wastewater treatment facility, water quantities are generally expressed in terms of million gallons per day (mgd). When referencing pumping capacities, water quantities are provided in terms of gallons per minute (gpm). Some commonalities of terms need to be addressed for the ease of the reader such as:

Reclaimed Water = Reuse Water
1 acre = 43,560 square feet
1 acre-foot = 325,850 gallons
1 mgd = 694 gpm
Ground Water Discharge = Land Application or Irrigation

1.0 Project Planning

The City of Carlsbad (City) has recognized that they possess a valuable asset in the treated effluent water discharged from the City's Wastewater Treatment Facility (WWTF) and has implemented a phased program to implement beneficial use of this water. The primary purpose of the City's reuse program is to reduce the use of potable water for irrigating City parks, cemeteries, and the golf courses by changing the irrigation water to use reclaimed wastewater or effluent reuse water from the WWTF. The City has implemented the first phases of the reuse program to irrigate the Municipal Golf Course and parks with reuse water. This program put the City on a track of reusing this valuable asset in which they plan to further extend the reuse infrastructure to offset the use of potable water with reuse water.

The City contracted HDR Engineering, Inc. (HDR) to prepare a Preliminary Engineering Report to update the reuse program. The goals for the report are to:

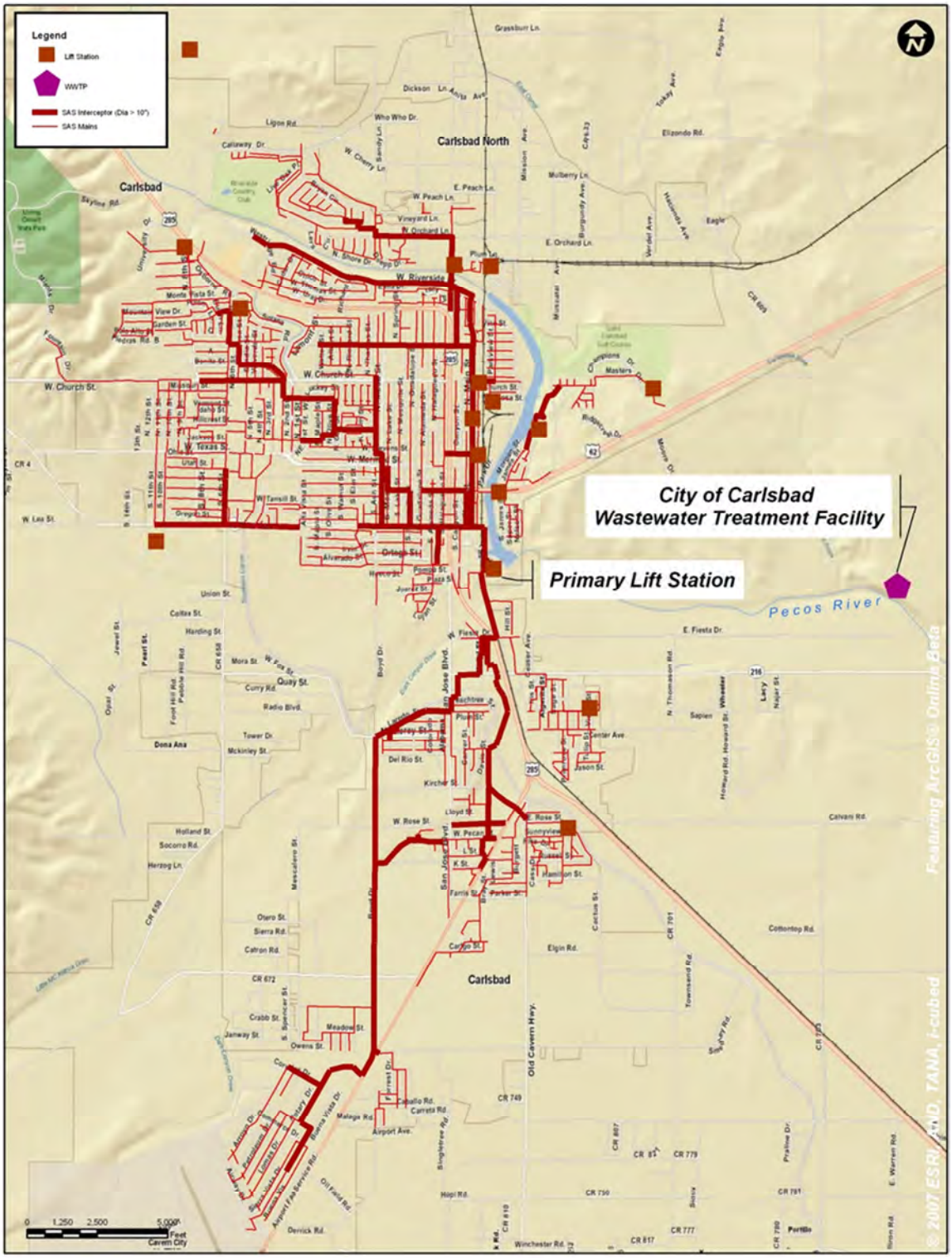
- Review the overall reuse plan and program
- Review regulatory requirements
- Review the quantity of water available for reuse
- Update irrigation water needs
- Update irrigation priority areas
- Analyze size and capacities of existing reuse infrastructure and provide preliminary sizing for new infrastructure
- Develop a phasing plan for expanding the reuse system for the preferred alternative

This report is a planning level document; as such measures recommended within should be implemented after conducting more detailed pre-design and design-level analyses.

a) Location

The City of Carlsbad is located in southeast New Mexico in Eddy County. The City owns and operates the wastewater system, which consists of the collection system, Primary Lift Station and WWTF. The sewer collection system collects domestic wastewater within City limits, which is then pumped through the Primary Lift Station the WWTF where it is treated and discharged to the Pecos River or reused for irrigation. The WWTF is located at 45 Tell Tale Lane in Carlsbad. See Figure 1 for an overall location map of the wastewater system.

Figure 1. Overall Location Map of Carlsbad Wastewater System



b) Environmental Resources Present

An Environmental Information Document has been prepared and is provided under separate cover.

c) Population Trends

According to the 2010 US Census, the population of Eddy County was estimated to be 53,829. For the City of Carlsbad, the population was estimated to be 26,138. The US Census for 1990 and 2000 reported the population of Carlsbad at 24,896 and 25,625 respectively. The University of New Mexico Bureau of Business & Economic Research (UNM BBER) develops population projections throughout the state and estimates an approximate 21.2% increase in population for Eddy County up to the year 2040. After applying this projection to the US Censes estimates, a future population of 31,688 can be estimated for Carlsbad. Table 1 below summarizes the population trends for Eddy County and Carlsbad.

Table 1. Population Trends Based on BBER

Year	2010	2015	2020	2025	2030	2035	2040
Eddy County Population	53,829	55,832	57,908	59,945	61,836	63,595	65,258
Cumulative % Increase	-	3.72%	7.58%	11.36%	14.87%	18.14%	21.23%
Carlsbad Population	26,138	27,111	28,119	29,108	30,026	30,880	31,688

Information taken from 2010 US Census and UNM BBER

The population growth could potentially be even higher depending on the growth of local oil and gas industry, which is expected to see a significant increase in future years. Evaluating data for the number of water meters installed determined there were 11,561 water meters in 2008 which increased by 6.8% to 12,275 in 2013. This equates to an increase of 1.24% each year. Table 2 below summarizes population trends based on the increase of water meters experienced over the last five years.

Table 2. Population Trends Based on Water Meters Installed

Year	2015	2020	2025	2030	2035	2040
Total Water Connections	12,580	13,337	14,225	15,126	16,084	17,103
Cumulative % Increase	-	8.98%	15.88%	23.22%	31.03%	39.33%
Carlsbad Population	27,111	29,545	31,417	33,407	35,523	37,774

Water meter and population projections were developed using historical data only and do not take into account any economic development for the City of Carlsbad. This information is intended to provide a second means to project potential population growth for this document only and is not intended for any other use.

d) Community Engagement

The City recognizes that community engagement crucial in order to inform and gain acceptance for the project by the general public. In effort to engage the community, presentations of the project of the project will be made in front of City Council and at the City's Water & Sewer Board meeting which are both open to the public. The City's Water and Sewer board consists of five members including the Mayor, City Administrator and three City water customers and meets on a monthly basis. A presentation by HDR was made at the May 15, 2014 Water & Sewer Board meeting. The presentation covered the intent of the reuse program, summary of water quantity, potential irrigation sites, alternatives considered, existing and new reuse infrastructure and estimated costs. A copy of the presentation is provided in Appendix G. A follow up presentation to the Water & Sewer Board along with a presentation at a City Council meeting will be scheduled. The presentations will include similar information along with an update of the project status. A public hearing was also conducted as part of the Environmental Information Document which is provided under separate cover.

2.0 Existing Facilities

The City's existing reuse infrastructure consists of a reuse pump station at the WWTF, distribution pipeline to the Municipal Golf Course, storage ponds and an irrigation pump station at the golf course. Photos of the existing infrastructure are illustrated in Figure 2 and Figure 3.

Figure 2. Existing Reuse Pump Station at WWTF

Figure 3. Existing Storage Pond and Irrigation Pump Station at Municipal Golf Course

a) Location Map

Location maps of the reuse facilities are provided in Figure 4 and Figure 5.

Figure 4. Location Map of Existing Reuse Facilities

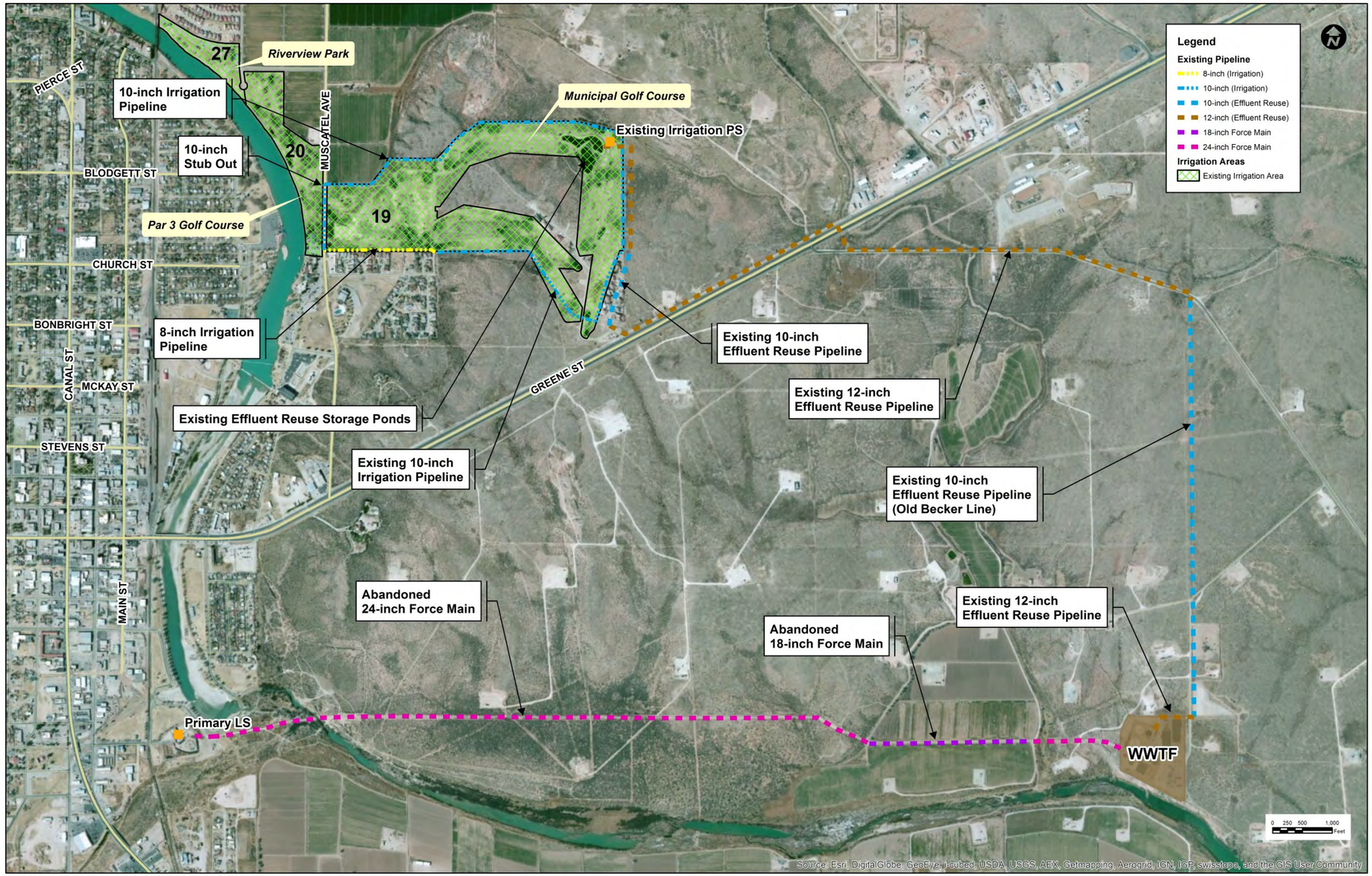
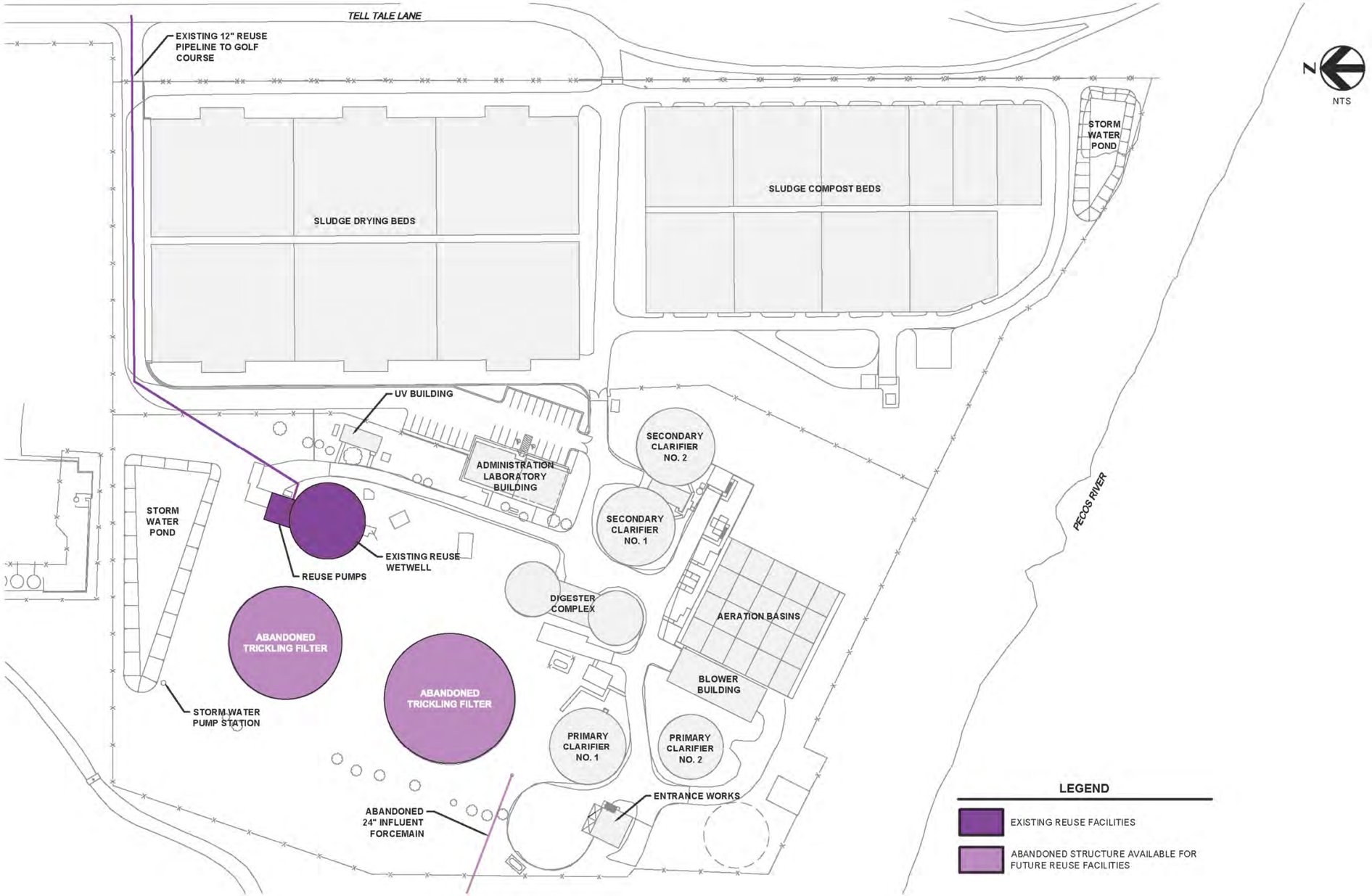


Figure 5. Site Plan of Existing Wastewater Treatment Facility



b) History

In the early 1990's, the City initiated the effluent reuse program to conserve potable water by changing the source of irrigation water from potable to treated effluent water. Studies were conducted to review the practicality of implementing the reuse program and to develop the initial program phasing. The first phase of the reuse program was implemented in the late 1990's and included irrigating the Municipal Golf Course which was previously irrigated with raw water diverted directly from the Pecos River. Subsequent phases were completed in 2008 and added the storage ponds, irrigation pump station and irrigation loop lines at the Municipal Golf Course. With the facilities that are currently in place, the City irrigates the Municipal Golf Course, Par 3 Golf Course, and Riverview Park with reuse water.

c) Condition of Existing Facilities

The City owns and operates the WWTF that treats all of the City's wastewater. The WWTF includes physical, biological, and chemical treatment processes to produce quality effluent to meet both the National Pollutant Discharge Elimination System (NPDES) permit for discharge to the Pecos River and groundwater discharge permit for irrigating with reuse water. The biological process is an activated sludge process known as the Modified Ludzack-Ettinger (MLE) process, which includes anoxic and oxic zones to reduce the total nitrogen concentration levels in the wastewater effluent to less than 10 mg/l. The solids are digested in anaerobic vessels and then composted. Treated effluent is disinfected by ultraviolet (UV) disinfection prior to discharge. The WWTF recently underwent major renovations and is able to treat wastewater to meet the permit limits for both the City's NPDES and groundwater discharge permits.

The existing reuse facilities are located at the WWTF and at the Municipal Golf Course and are comprised of the following:

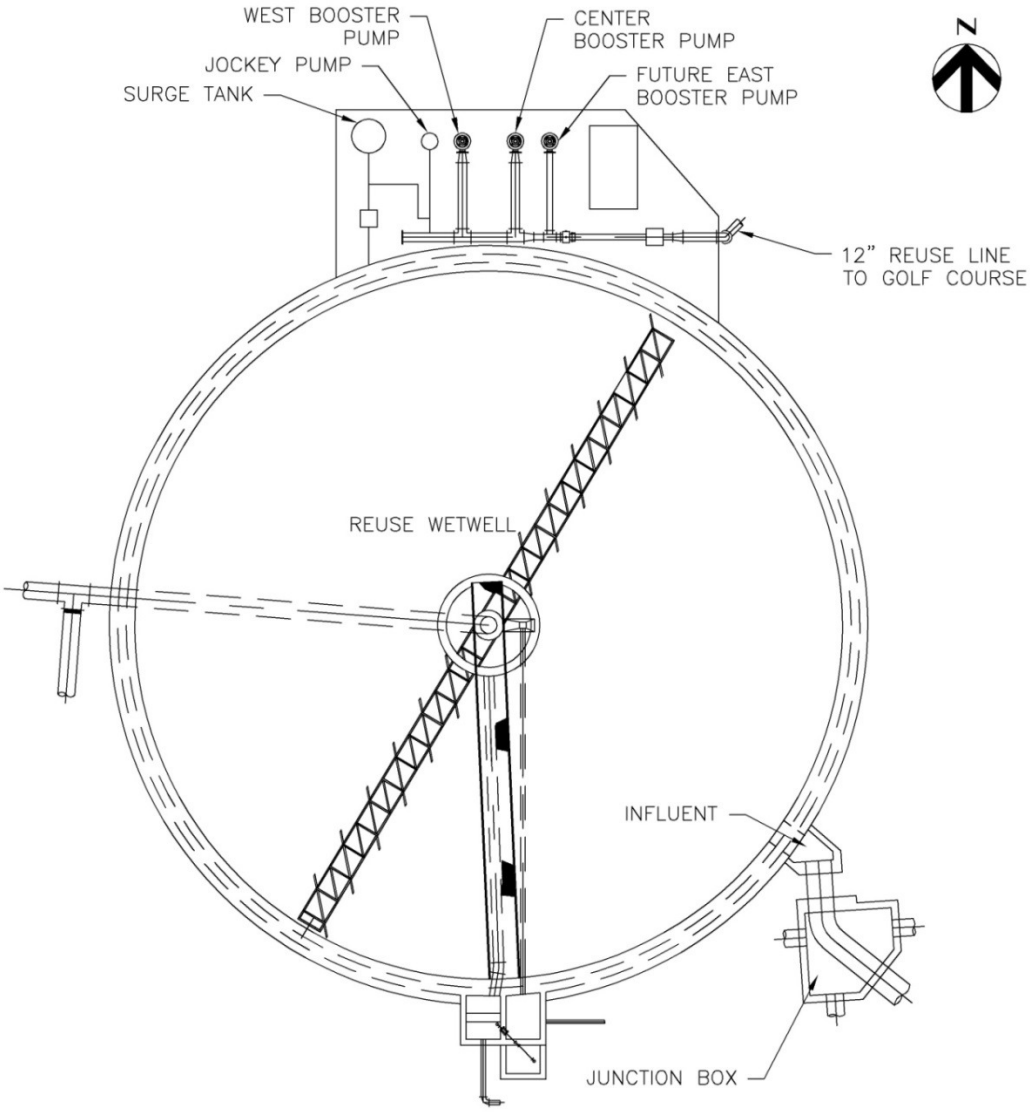
- Reuse pump station at WWTF
- Reuse pipeline
- Reuse storage ponds at Municipal Golf Course
- Reuse irrigation pump station at Municipal Golf Course
- Irrigation loop pipeline at Municipal Golf Course
- Abandoned trickling filter tanks and influent forcemain

The reuse pump station was constructed in the late 1990's and is located at the WWTF. An old final clarifier previously used as a chlorine contact basin serves as the pump station wetwell. The pump station contains two vertical turbine pumps and also has space for a third pump. These pumps transfer reuse water to the golf course storage ponds. The pump station also includes a surge tank and a jockey pump to maintain pressure in the distribution pipeline, see Figure 6.

The reuse pipeline that conveys water from the WWTF to the storage ponds is approximately 2 miles in length and varies in size from 10-inch to 12-inch in diameter. From the WWTF, the 12-inch reuse line is connected to an old 10-inch CL 150 asbestos cement (AC) line (Old Becker Line) on public lands administered by the Bureau of Land Management (BLM) up to US Refinery Road. A 12-inch C900 poly-

vinyl chloride (PVC) line was installed along Refinery Road and Green Street (US 62/180) and connected to an existing 12-inch CL 150 (AC) line that discharges to the storage ponds. The capacity of the reuse pipeline is limited by the 10-inch AC pipe section along BLM land which should be considered to be replaced due to its age.

Figure 6. Existing Reuse Pump Station



There are two reuse storage ponds, a reuse booster pump station, and a 10-inch irrigation loop that are used for irrigating the golf course. These facilities were constructed in 2008. A 10-inch stub-out was placed on the irrigation loop where the pipeline intersects Muscatel Avenue. The 10-inch irrigation loop is connected to 6-inch and 4-inch irrigation lines for the Par 3 golf course and a 6-inch line for Riverview Park. Due to the smaller diameter pipe irrigation of the Par 3 Golf Course and Riverview Park is inefficient.

The City has salvaged and considered reusing two abandoned trickling filters at the WWTF for additional reuse storage. The existing trickling filters were constructed with the original WWTF in the early 1960's and the rotary distributors were removed leaving the concrete tanks in place. Concrete on the north trickling filter has deteriorated to a point that it is not useable, however, the south trickling filter could be used with some concrete patching and modifications.

The abandoned 24-inch influent forcemain between the Primary Lift Station and WWTF has also been considered as a potential pipeline for conveying reuse water. Due to the age and concerns with of the pipeline integrity, the forcemain was replaced in the early 2000's and the old 24-inch diameter prestressed concrete cylinder pipe (PCCP) was abandoned in place. When abandoned, the forcemain was flushed and capped. The overall length of the forcemain is approximately 2-1/2 miles but it includes a section of 18-inch PVC pipe that would limit the forcemain capacity.

Table 3 provides a summary of the existing reuse system infrastructure.

Table 3. Existing Reuse Infrastructure

Component	Capacity
Reuse pump station at WWTF	2 – Vertical Turbine Pumps each rated for 865 gpm @ 220 TDH (75 hp) Wet well 80' diameter w/ 9' side water depth Capacity: 340,000 gallons
Reuse pipeline	Diameter varies from 12-inch to 10-inch, capacity limited by 10-inch
Reuse storage ponds at golf course	Upper Pond 1.36 acres x 5-feet deep Working Capacity: 6.8 acre-feet (2.2 MG) Lower Pond 0.8 acres x 5-feet deep Working Capacity: 4.0 acre-feet (1.3 MG)
Reuse irrigation pump station at golf course	3 – Irrigation Pumps, each rated for 800 gpm (75 Hp) Total Pumping Capacity: 2,400 gpm
Abandoned trickling filter storage basin (not currently used)	130' diameter w/ 51" water depth Capacity: 430,000 gallons
Abandoned 18" – 24" pipeline from primary lift station to WWTF (not currently used)	Capacity limited by 18-inch, upper limit ~ 4,350 gpm

d) Financial Status of Existing Facilities

2.d.1 Water and Sewer Rates

The City operates both the water system and sewer system as a joint utility. A water and sewer rate study was prepared by Smith Engineering in 2009 for the WWTF renovations CWSRF loan and the rate increase was implemented. Water and sewer rates effective October 1, 2013 are listed in Table 4 and Table 5.

Table 4. City of Carlsbad Water Rates

Water Meter Size (inches)	Residential	Commercial
0.75	$9.15	$11.42
1.0	$10.26	$11.42
1.5	$11.35	$22.86
2.0	$12.45	$40.66
3.0	-	$91.48
4.0	-	$162.63
6.0	-	$365.94
Incremental Usage Charges		
Water Usage (Thousand Gallons)	**Rate / 1,000 gallons**	
Above 3 and up to 10	$1.08	
Above 10 and up to 25	$1.19	
Above 25 and up to 50	$1.38	
Above 50 and up to 100	$1.54	
Above 100 and up to 500	$1.75	
Above 500	$1.93	

Table 5. City of Carlsbad Sewer Rates

Water Meter Size (inches)	Residential	Commercial
0.75	$16.63	$19.46
1.0	$16.63	$19.46
1.5	$17.37	$33.64
2.0	$17.37	$54.67
3.0	-	$118.72
4.0	-	$206.94
6.0	-	$459.01
Incremental Usage Charges		
Water Usage (Thousand Gallons)	**Rate / 1,000 gallons**	
Above 3 and up to 10	$2.11	
Above 10 and up to 25	$2.33	
Above 25 and up to 50	$2.56	
Above 50 and up to 100	$2.79	
Above 100 and up to 500	$3.06	
Above 500	$3.33	

2.d.2 Wastewater Expenditures

The City's FY 2013 sewer expenditures for salaries and operating expenses are summarized in Table 6.

Table 6. Wastewater Expenditures

Monthly Period	Amount
July 2013	$63,827.40
August 2013	$84,408.08
September 2013	$87,006.97
October 2013	$94,732.45
November 2013	$83,165.04
December 2013	$60,430.59
January 2014	$75,117.13
February 2014	$72,849.03
March 2014	$72,328.68
April 2014	$46,541.47
May 2014	$76,679.52
June 2014	$54,374.77
FY 2013-2014 O&M Costs	**$871,461.13**

2.d.3 Water and Sewer Connections

As of June 2014, the City had 12,460 water connections and 9,891 sewer connections.

2.d.4 Debt

The City is repaying 2009 water and sewer revenue bonds with an annual payment of $208,770. The bonds are scheduled to mature on June 1, 2029.

The City entered into a Clean Water State Revolving Loan Fund (CWSRF) agreement with a total maximum amount of $18,000,000 for the wastewater treatment facility renovations. The first payment is not required until one year after the completion of construction and is yet to be closed.

e) Water/Energy/Waste Audits

No audits have been conducted for the City's reuse facilities.

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3.0 Need for Project

a) Health, Sanitation, and Security

Land application or irrigation of land using reclaimed wastewater is considered groundwater discharge since the water can percolate down to the groundwater. The State regulates the use of reclaimed wastewater to ensure the protection of public health and the environment. The New Mexico Environment Department (NMED) Ground Water Bureau is responsible for issuing these permits.

Groundwater discharge permits are issued based on intended usage, water quality, and access restrictions as written in the NMED Ground Water Quality Bureau Guidance, January 2007. Table 7 lists the various classifications of reclaimed wastewater along with their approved uses. A copy of the Guidance is provided in the Appendix B. The State has issued the City a groundwater discharge permit (Permit No. DP-1274) that allows for irrigation with treated WWTF effluent. The permit allows the City to irrigate up to 750 acres of City-owned cemeteries, parks, golf courses, and landscape facilities and to provide water for ponds, streams and other aesthetic features at the golf course using the effluent from the WWTF. This use and water quality is classified as Class 1B. The permit was renewed on January 11, 2014. A copy of the City's current groundwater discharge permit is provided in Appendix A.

Discharge to the Pecos River requires a National Pollutant Discharge Elimination System (NPDES) permit from the United States Environmental Protection Agency (USEPA) through a permitted outfall at the WWTF, NPDES Permit No. NM0026395.

Table 7. Approved Uses for Reclaimed Wastewater by Class

Class of Reclaimed Wastewater	Approved Uses
Class 1A	All Class 1 uses. *No setback limit* to dwelling unit or occupied establishment
	Backfill around potable water pipes
	Irrigation of food crops [1]
Class 1B ***(Classification for City of Carlsbad)***	Impoundments (recreational or ornamental)
	Irrigation of parks, school yards, golf courses [2]
	Irrigation of urban landscaping [2]
	Snow making
	Street cleaning
	Toilet flushing
	Backfill around non-potable piping
Class 2	Concrete mixing
	Dust control
	Irrigation of fodder, fiber, and seed crops for milk-producing animals
	Irrigation of roadway median landscapes
	Irrigation of sod farms
	Livestock watering
	Soil compaction
Class 3	Irrigation of fodder, fiber, and seed crops for non-milk-producing animals
	Irrigation of forest trees (silviculture)

[1] Irrigation of food crops should only be allowed for food crops when there is no contact between the edible portion of the crop and the wastewater. Spray irrigation is prohibited for food crops.

[2] If reclaimed wastewater is applied using spray irrigation, the setback limitation of (Table 9 of this report) "Spray Irrigation" should be observed. NMED GWQB

The City's current NPDES permit limits are similar to the wastewater quality standards required for Class 1B reuse but the City's groundwater discharge permit also includes a total nitrogen concentration limit of 10 mg/l. Table 8 summarizes the minimum water quality requirements for Class 1B reuse.

Table 8. Wastewater Quality Requirements

Class of Reclaimed Wastewater	Wastewater Quality Parameter	Wastewater Quality Standards	
		30-Day Average	Maximum
Class 1B	BOD_5	30 mg/l	45 mg/l
	TSS	30 mg/l	45 mg/l
	Fecal Coliform	100 organisms per 100 ml	200 organisms per 100 ml
	TRC or UV Transmissivity	Monitor Only	Monitor Only

Class 1A, 2, and 3 not shown, see Appendix C for complete table

Access and restrictions for Class 1B reuse is listed below in Table 9. The irrigation system used for the golf course is a spray irrigation system, which requires a 100-foot setback from dwellings.

Table 9. Access Restrictions and Setback Requirements

Class of Reclaimed Wastewater	Spray Irrigation	Flood / Surface Drip Irrigation
Class 1B	• No access control; irrigate at times when public exposure unlikely • 100 ft set-back to dwelling unit or occupied establishment • Low pressure/low trajectory irrigation system only	• No access control; irrigate at times when public exposure unlikely

Class 1A, 2, and 3 not shown, see Appendix C for complete table

Surface Loading of Land Application Sites

There are two loading criteria regulated by the State that must be considered for using reuse water: water runoff and nitrogen loading. The first consideration is that water cannot be applied at a greater rate than the ground can absorb it, i.e. if reuse water is applied too fast and it flows off site or if the ground is frozen thereby preventing it from being absorbed and it flows offsite. The second regulated loading criteria in the groundwater discharge permit limits a maximum of 200 pounds (lbs) of nitrogen applied per year per acre, which includes any nitrogen applied as fertilizer. Accordingly, based on the maximum nitrogen concentration limit of 10 mg/L in the treated effluent water and yearly irrigation rate of 43.5-inches per acre per year as shown on Figure 8, or 1.18 MG of water per year, the nitrogen loading per acre per year equates to 98 lbs per acre (lbs = concentration (10 mg/L) x flow (1.18 MG) x (8.34 lbs/MG/mg/L)), which is considerably less than the 200 pounds limited by the permit. Since the limitation is total nitrogen applied to the ground, the City will need to monitor the total nitrogen applied through the reuse water and by fertilizers applied to the ground.

b) Aging Infrastructure

The majority of the City's existing reuse infrastructure is in relatively good condition with no major problems with the exception of the reuse pump station which is 15 years of age. Due to their age, the reuse pumps may need to be replaced. The 10-inch reuse pipeline section through BLM land (Old Becker Pipeline) is also aging and should be replaced and upsized. All of the existing facilities are currently functioning properly.

The proposed improvements for this project are to make improvements to the existing infrastructure as needed and extend reuse infrastructure to irrigate additional City parks and/or the City Cemetery.

c) Reasonable Growth

As the population within the City increases, the flows to the WWTF will increase, which will result in an increase in the amount of water available for reuse purposes. The alternatives considered and rankings in this report ultimately will determine the project phasing. Continued monitoring of the WWTF effluent flows will determine when the next area of the reuse system can be constructed. The 2040 population projection of 31,688 from Table 1 equates to a future WWTF flowrate of 2.45 mgd or 2,744 acre-feet/year. Based on population projections by the increase of water meters as summarized on Table 2, the 2040 population is estimated to be 37,774 equating to 2.92 mgd or 3,270 acre-feet/year.

4.0 Alternatives Considered

The purpose of this project is to evaluate alternatives to improve the reuse system and further expand reuse infrastructure to irrigate additional parks and/or the City Cemetery. Multiple alternatives were considered including no action and extending the reuse system infrastructure to provide irrigation at new sites. Alternative 1 is the no action alternative to continue to irrigate using reuse water as currently done. Alternative 2 includes improving the existing irrigation infrastructure and extending the system to provide reuse water for additional irrigation sites along both sides of the Pecos River (Lake Carlsbad) north of Green Street. Alternative 3 includes providing reuse water for additional irrigation sites south of Green Street and the City Cemetery. Alternative 4 includes providing reuse water for irrigation sites along both sides of the Pecos River (Lake Carlsbad). These alternatives are based on maximizing the total reuse water available based on the water inventory and irrigation demands discussed in the following subsections. The preferred alternative can be further separated into multiple phases, as required to match the City's available funding.

Effluent Reuse Water Inventory

Currently, treated WWTF effluent is either returned to the Pecos River or pumped to City parks and the golf course for irrigation of the fairways and greens. A water inventory indicates there is additional reuse water available for irrigating other areas. The amount of water available for irrigation is the total amount of water treated at the WWTF less what is required to be returned to the Pecos River in accordance with the City's water rights.

The City possesses several water rights for the drinking water system that are administered by the Office of the State Engineer (OSE). Some of the City's water rights require the City to return a certain amount of treated effluent water to the Pecos River. The City has prioritized the use of the water rights to utilize water rights with no return flow first in order to minimize the total required return flow. The maximum return flow required by all of the City's water rights is 1,414.59 acre-feet/year. The actual return flow is measured through a permitted outfall at the WWTF. Table 10 and Table 11 summarize historical effluent reuse water used for irrigation and effluent water returned to the Pecos River for the period between 2007 and 2013. As indicated in the table, there has been a significant reduction in the total WWTF daily flow. The cause for the reduction has not been determined but it is suspected that it can be attributed to improvements made to the sewer collection system which reduced issues with inflow and infiltration. Reductions of wastewater flows have been experienced throughout the southwest which can be attributed to water conservation. The flows have been more consistent between the years of 2011 to 2013 so the average of these flows was used for developing the water inventory.

Table 10. Historical Water Inventory

Year	Return Flow to River (ac-ft/yr)	Effluent Reuse at Golf Course (ac-ft/yr)	Total WWTF Effluent (ac-ft/yr)	Total WWTF Effluent (MG/year)	Average WWTF Daily Effluent Flow (mgd)
2007	2,939.39	319.96	3,259.35	1,062.06	2.91
2008	2,755.14	365.80	3,120.94	1,016.96	2.79
2009	2,355.02	413.27	2,768.29	902.05	2.47
2010	2,117.22	365.91	2,483.13	809.13	2.22
2011	1,804.73	456.00	2,260.73	736.66	2.02
2012	1,843.39	378.04	2,221.40	723.84	1.98
2013	1,859.85	345.67	2,220.51	718.67	1.97
*Avg	1,829.80	384.71	2,214.51	721.60	2.00

* Average flows were calculated by taking the geometric mean from 2011 to 2013. Geometric mean was used because this method normalizes the varying ranges so that no range dominates the average.

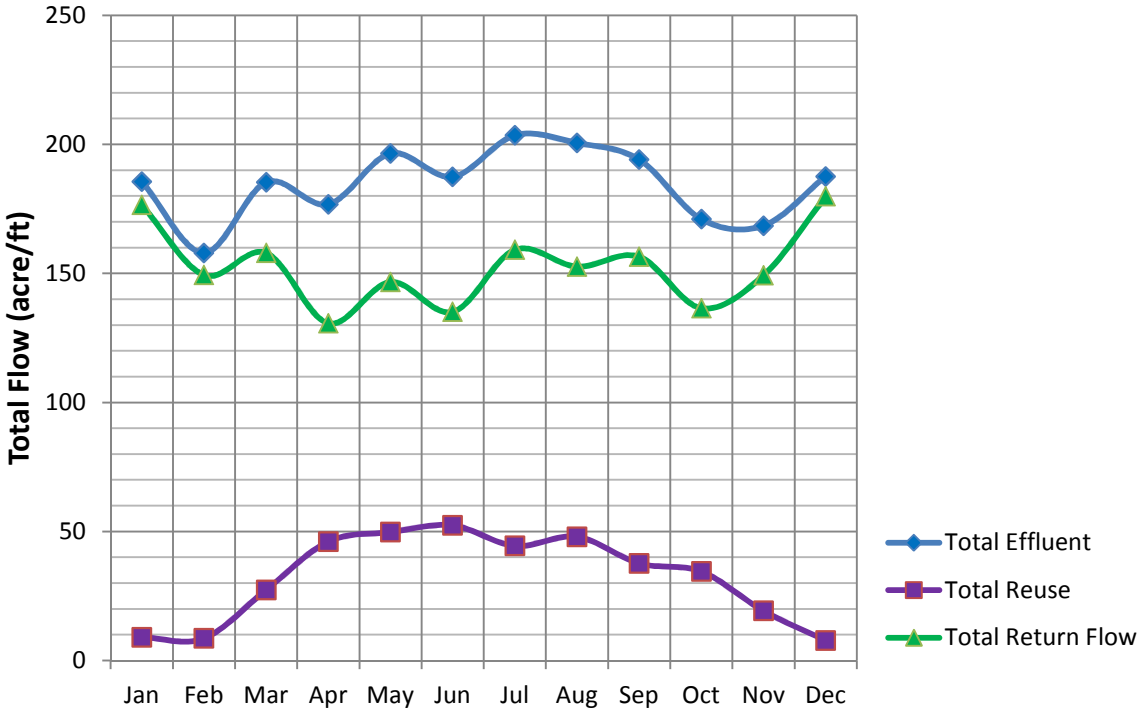
Historically, the City has been returning more flow to the Pecos River than required by the return flow in their water rights. If the City reduces the amount of effluent discharged to the Pecos River, the additional effluent available could be used to irrigate additional irrigation sites, refer to Table 11.

Table 11. Effluent Water Inventory (Monthly Summary)

Month	Effluent (acre-feet)	Total Reuse (acre-feet)	Return Flow (acre-feet)
January	185.56	9.05	176.51
February	157.95	8.58	149.36
March	185.28	27.39	157.88
April	176.76	46.09	130.67
May	196.42	49.77	146.65
June	187.41	52.34	135.07
July	203.50	44.41	159.09
August	200.53	47.94	152.59
September	194.06	37.63	156.43
October	171.01	34.52	136.49
November	168.49	19.24	149.25
December	187.56	7.76	179.80
Yearly Totals	**2,214.52**	**384.71**	**1,829.80**

Based on the effluent water inventory, a seasonal plot by month of the total effluent, current reuse and return flow is provided on Figure 7. As shown on the figure, the majority reuse flow for irrigation is used in the summer months and considerably less during the winter.

Figure 7. Current Yearly Irrigation and Return Flows

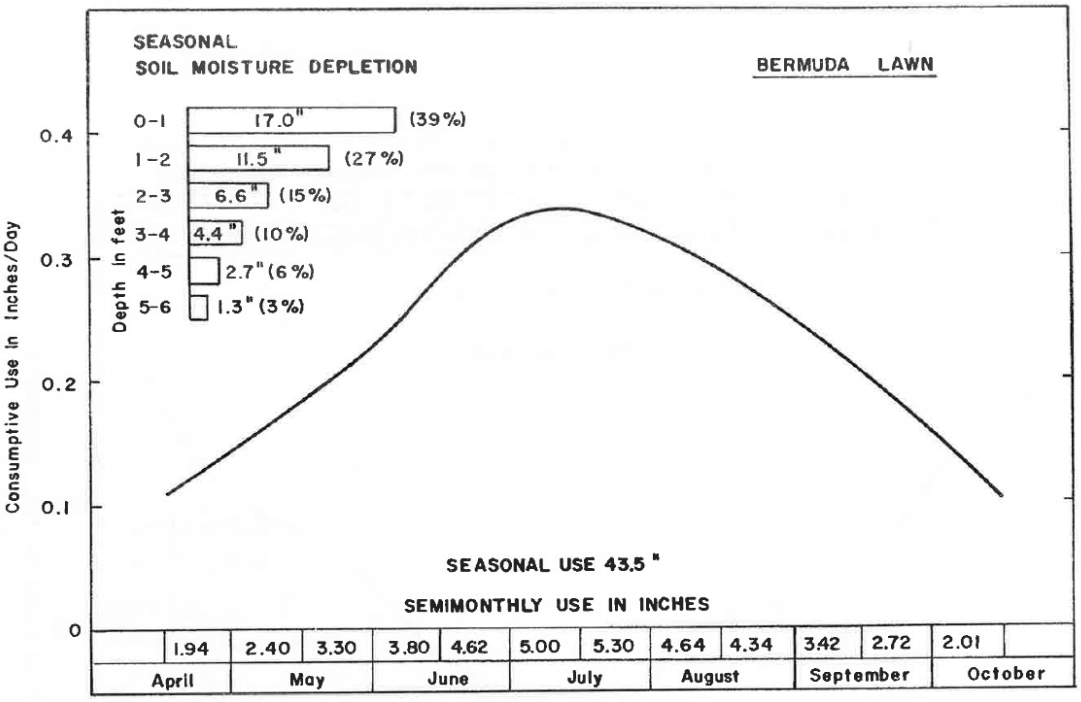


The City does not irrigate the golf course fairways or the City parks between November and April; only the golf course greens and tees are irrigated during the winter. The required return flow amount is an annual requirement rather than a daily requirement so the water can be returned at any time within a given year. To ensure that they meet their return flow requirements, more water can be returned to the Pecos River during the non-irrigation season and less can be returned during the irrigation season.

Irrigation Demands

A study prepared by the United States Department of Agriculture (USDA) entitled "Consumptive Use of Water by Major Crops in the Southwestern United States", reviewed water consumption for various types of crops. The seasonal water consumption for Bermuda grass from the study is 43.5 inches per year as shown on Figure 8. The area of the irrigations sites currently irrigated with reuse water is roughly 105 acres and with the exception of the golf course greens and tee boxes consists primarily of Bermuda grass. Historical records indicate the City uses approximately 384.7 acre-feet of reuse water per year which is equivalent to approximately 44 inches per year. This is in line with the 43.5 inches per year (3.625 feet per acre per year) per the USDA Study.

Figure 8. Seasonal Water Usage for Bermuda Grass



Based on the water inventory listed on Table 11, the City returns on average 1,829.8 acre-feet per year to the Pecos River, which exceeds the City's return flow requirement by 415.2 acre-feet per year. With an additional 415.2 acre ft/year available, the City could irrigate an additional area of 114.5 acres. The peak irrigation demand from Figure 8 is 10.3 inches per acre in the month of July. This equates to an average daily demand of approximately 9,000 gallons per acre per day.

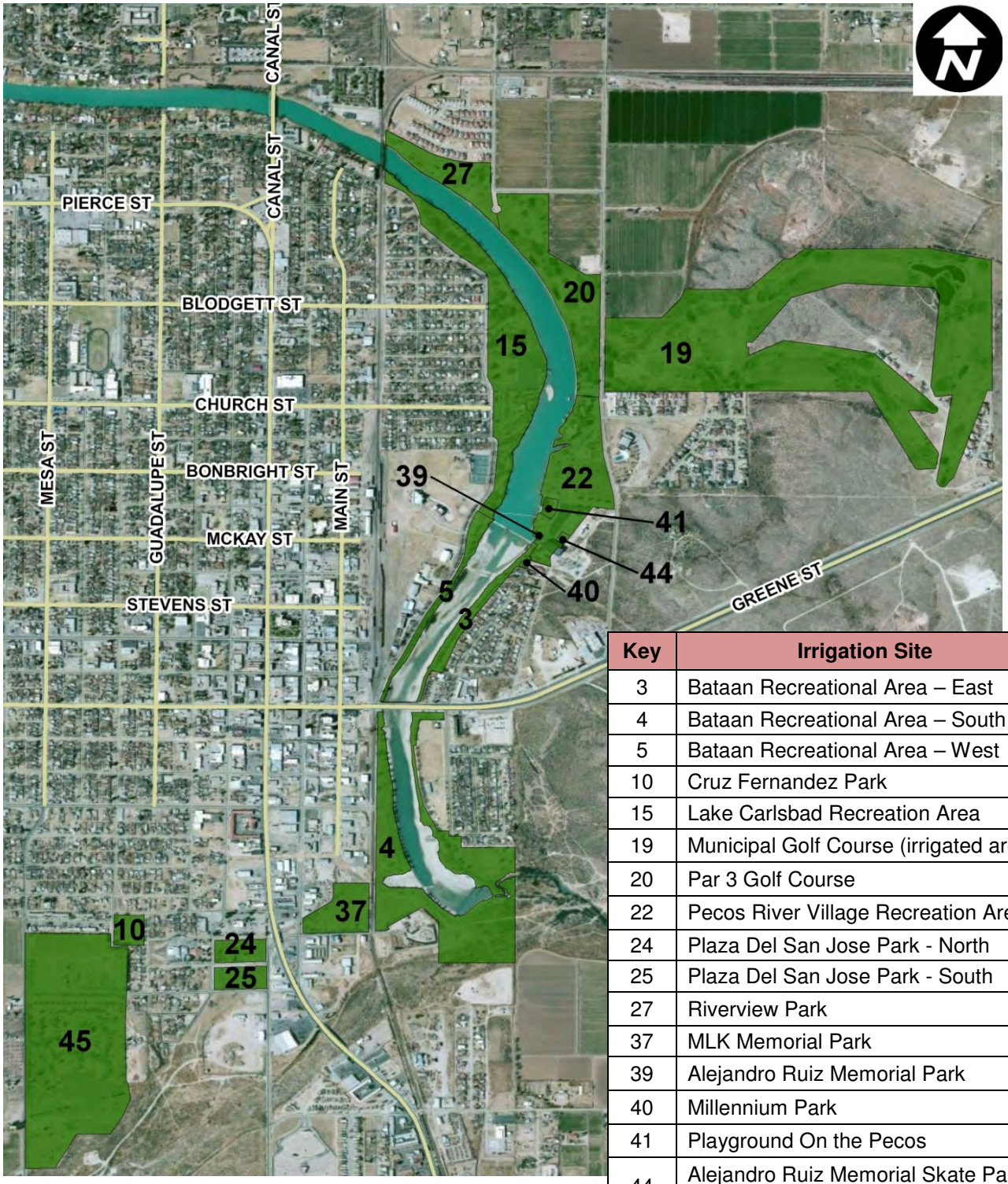
In addition to the City's current water rights, HDR had previously contacted the OSE regarding the City's water rights in which the OSE indicated that communities could be given a credit up to 30 percent for irrigating with reclaimed water assuming that a percentage of the land applied water percolates into the ground water. OSE also suggested that the Interstate Stream Commission (ISC) may disagree with the credit since the proposed location for the discharge is relatively close to the Texas border and it could be debatable as to whether ground water recharge through irrigation actually benefits the river. HDR met with the OSE in order to start the process to request this credit. OSE clarified that the credit only applies only for flood irrigation and not sprinkler irrigation in which the City would not be eligible for the credit since the irrigation system is comprised of a sprinkler irrigation system.

Potential Future Irrigation Sites

In addition to the Municipal Golf Course, potential irrigation sites were identified and are shown on Figure 9. The City possesses other parks which are irrigated with potable water, however, these parks were not considered for effluent reuse due to their proximities which would not be cost effective or feasible to construct reuse infrastructure to reach them. The City also has listed Sunset Cemetery as an irrigation site for the groundwater discharge permit. However, because it is not currently irrigated with potable water, Sunset Cemetery does not meet the intent of the reuse program, which is to offset potable water use with reuse water.

Irrigation demands for these sites were determined using the peak water requirement of 10.3 inches in the month of July. Irrigation pumping rates are based on the permit requirements of watering being limited to times when public exposure is unlikely so it is assumed that watering will occur only within an 8-hour period during the night time hours.

Figure 9. Location Map of Potential Irrigation Sites



Key	Irrigation Site
3	Bataan Recreational Area – East
4	Bataan Recreational Area – South
5	Bataan Recreational Area – West
10	Cruz Fernandez Park
15	Lake Carlsbad Recreation Area
19	Municipal Golf Course (irrigated area)
20	Par 3 Golf Course
22	Pecos River Village Recreation Area
24	Plaza Del San Jose Park - North
25	Plaza Del San Jose Park - South
27	Riverview Park
37	MLK Memorial Park
39	Alejandro Ruiz Memorial Park
40	Millennium Park
41	Playground On the Pecos
44	Alejandro Ruiz Memorial Skate Park (Not Irrigated)
45	Carlsbad Cemetery

4.1 Alternative 1 – No Action

a) Description

Alternative 1 is to maintain the existing reuse infrastructure to irrigate the Municipal Golf Course, Par 3 Golf Course and Riverview Park and not expand to other irrigation sites. The irrigation sites and estimated water demands for the existing irrigation area are summarized in Table 12.

Table 12. Alternative 1 – Existing Irrigation Sites

Map Key	Irrigation Site	Area (acres)	Average Daily Demand of 9,000 gal/ac (gal)	Equivalent 8-Hour Pumping Rate (gpm)
Current Irrigation Sites for North System				
19	Municipal Golf Course	70	630,000	1,313
20	Par 3 Golf Course	24.5	220,500	459
27	Riverview Park	10.3	92,700	193
	Totals	**104.8**	**943,200**	**1,965**

Currently, the City returns in excess of 415 acre-feet/year over the return flow requirement. With this alternative, the City cannot use this effluent to offset and conserve potable water.

b) Design Criteria

There is no design criteria for this alternative.

c) Map

The location map for Alternative 1 – No Action system is the existing reuse infrastructure previously shown on Figure 4 and Figure 5.

d) Environmental Impacts

There are environmental impacts for no action.

e) Land Requirements

There are no additional land requirements for this alternative.

f) Potential Construction Problems

There is no construction for this alternative.

g) Sustainability Considerations

i) Water and Energy Efficiency

The purpose of this project is to reduce the use of potable water for irrigation purposes by using wastewater effluent which this alternative does not do.

ii) Green Infrastructure

This section is not applicable.

iii) Other

This section is not applicable

h) Cost Estimates

There are no additional costs for this alternative.

4.2 Alternative 2 – North System

a) Description

Alternative 2 includes improving the existing irrigation system and extending the reuse system to provide reuse water for new irrigation sites on both sides of the Pecos River (Lake Carlsbad) north of Green Street. The irrigation sites and water demands for the northeast area are summarized in Table 13. Currently, the Golf Course, Par 3 Golf Course and Riverview Park are already irrigated with reuse water. This alternative is intended to improve the existing reuse system and further extend the irrigation system to additional irrigation sites. The Bataan Recreational Area south of Green Street was also considered as a potential irrigation site since it is within the vicinity and feasible to reach. It is recommended to include the irrigation demands into the proposed system or to provide provisions within the new irrigation system to irrigate this site with this system in the future.

Table 13. Alternative 2 – North System Irrigation Sites

Map Key	Irrigation Site	Area (acres)	Average Daily Demand of 9,000 gal/ac (gal)	Equivalent 8-Hour Pumping Rate (gpm)
Additional Irrigation Sites for North System				
22	Pecos River Village Recreation Area	23.3	209,700	437
3	Bataan Recreational Area – East	4.9	44,100	92
39	Alejandro Ruiz Memorial Park	0.1	900	2
40	Millennium Park	0.2	1,800	4
41	Playground On the Pecos	0.8	7,200	15
44	Alejandro Ruiz Memorial Skate Park (Not Irrigated)	-	-	-
15	Lake Carlsbad Recreation Area	34	306,000	638
5	Bataan Recreational Area – West	4.7	42,300	88
	North System Totals	**68**	**612,000**	**1,276**
4	Bataan Recreational Area – South	41.3	371,700	774
	Future System including Bataan recreational Area South Totals	**109.3**	**983,700**	**2,050**

The current irrigated area is 104.8 acres with an additional area of 68 acres for the north system and 109.3 acres total including the Bataan Recreation Area – South site. Water quantities were updated to include the existing reuse areas and are summarized on Table 14 for the proposed north system.

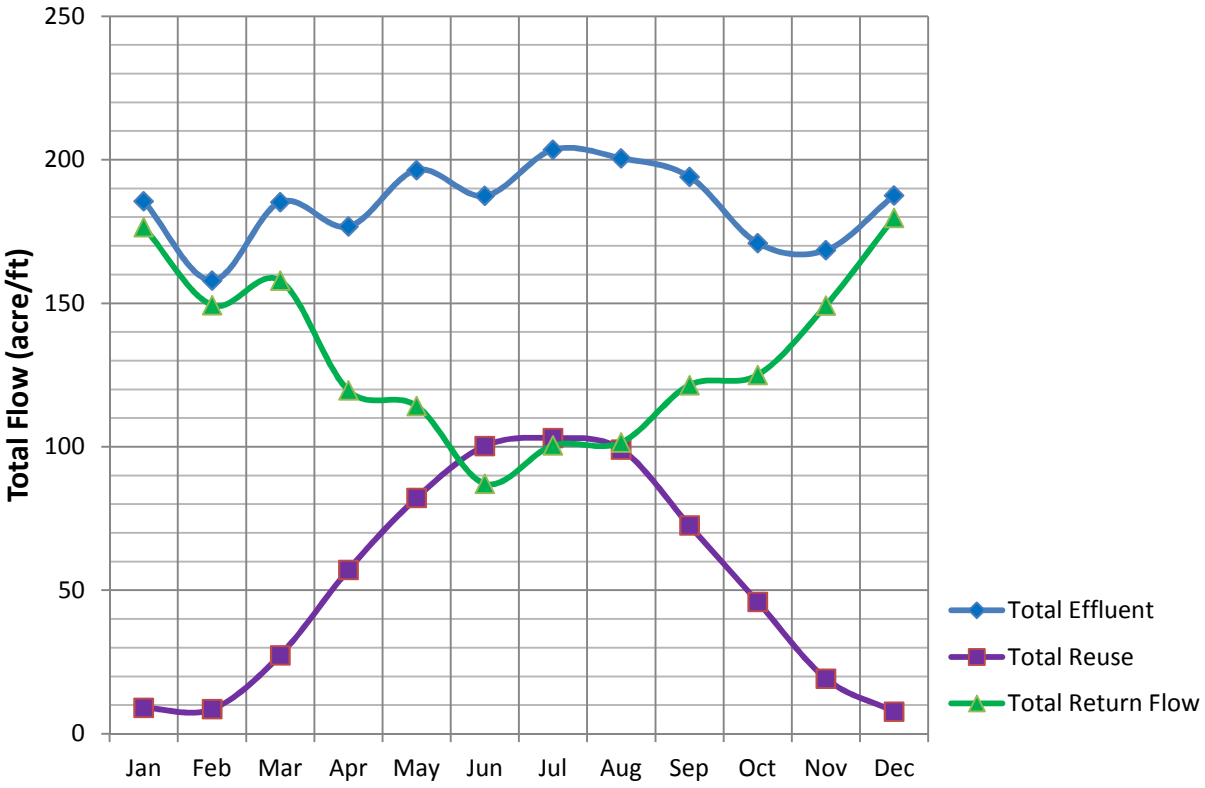
Table 14. Alternative 2 – North System Water Quantities

Month	Effluent (acre-feet)	Current Reuse (acre-feet)	Additional Reuse (acre-feet)	Return Flow (acre-feet)
January	185.56	9.05	0.00	176.51
February	157.95	8.58	0.00	149.36
March	185.28	27.39	0.00	157.88
April	176.76	46.09	17.67	113.00
May	196.42	49.77	51.92	94.73
June	187.41	52.34	76.70	58.37
July	203.50	44.41	93.82	65.27
August	200.53	47.94	81.80	70.79
September	194.06	37.63	55.93	100.50
October	171.01	34.52	18.31	118.18
November	168.49	19.24	0.00	149.25
December	187.56	7.76	0.00	179.80
Yearly Totals	**2,214.52**	**384.71**	**396.15**	**1,433.65**

Water quantities are based off irrigating 109.3 acres for the North System and Bataan Recreational Area – South.

Based on the quantities summarized on Table 14, there will be sufficient water to irrigate the north system irrigation sites resulting in an excess amount of 19.06 acre-feet of the required return flow of 1,414.59 acre-feet being returned to the Pecos River. The total effluent flow, seasonal irrigation demand flow and return flow for the proposed north system is shown on Figure 10.

Figure 10. North System Yearly Irrigation and Return Flows



b) Design Criteria

The following improvements and additional facilities required for the north system are:

- Modifications to existing reuse pump station
- New chlorine injection facility
- New reuse transfer pump station
- New reuse storage tank
- Increase size of reuse pipeline
- New reuse storage ponds at the golf course
- New reuse irrigation pump station
- New reuse irrigation pipelines

Descriptions of the improvements and additional facilities are based on the design criteria explained in the following subsections.

4.b.1 Modifications to Existing Reuse Pump Station

The existing reuse pumps are over 15 years of age and should be considered for replacement. For the expanded system and to provide for additional redundancy, a third reuse pump will be required. The new pumps should be sized to handle the total daily flow of 1.93 mgd required for the existing and proposed irrigation system. The pump station suction piping will also need to be modified to connect to the new

storage tank. It is also recommended that the existing pumps and piping at the pump station be repainted to correspond with the standard colors for reuse systems.

4.b.2 New Chlorine Injection Facility

The City is able to meet the discharge limits as required by the groundwater discharge permit for irrigating, however, it is recommended to install a liquid sodium hypochlorite feed system to inject chlorine in the reuse water to control algae growth. This will also provide the City with a backup disinfection system to the UV system for reuse as the disinfection standards for reuse are more stringent than that for discharging to the Pecos River. However, the system cannot be used for disinfecting effluent discharged to the River as the NPDES permit requires that there be no chlorine residual. The chemical feed system will include chemical storage, chemical feed pumps and appurtenances, piping, valves, instrumentation and controls and will be located at the WWTF. There is an abandoned building adjacent to the reuse pump station which can be renovated and used for the chemical feed system. The chemical feed system should include dosage control and be sized to provide a chlorine residual ranging between 2 to 5 mg/l at the pump station.

4.b.3 New Reuse Transfer Pump Station

A new reuse transfer pump station will be required to pump treated effluent from the reuse wet well to the new storage tank. There is sufficient area adjacent to the reuse wet well for the new transfer pump station. The pump station will need to be sized to handle the daily flows and shall include all necessary valves, piping, instrumentation and controls.

4.b.4 New Reuse Storage Tank

Typically, wastewater flows are higher in the day and low flows occur during the night. Irrigation is typically conducted during the night time hours to limit public exposure. A typical 24 hour operating scenario would be to fill the storage tanks constantly all day and irrigate during the night. At the WWTF, the reuse pump station wet well contains some storage capacity but serves more as a buffer for the peak daily flows. Additional storage at the WWTF is required to store treated effluent during the day when higher flows are experienced. A 2.0 MG storage tank will be required at the WWTF to provide the additional storage for the daily irrigation demand flow for the total north system.

4.b.5 Increase Size of Reuse Pipeline

The reuse pipeline from the WWTF to the Municipal Golf Course varies from 10-inch to 12-inch. The 10-inch section is limiting the flow through the pipeline and should be increased to a 12-inch diameter pipe. A new pipeline can be installed parallel to the existing pipeline or the existing pipe can be upsized by pipe bursting.

4.b.6 New Reuse Storage Ponds

Storage at the golf course currently includes two storage ponds, which have sufficient storage capacity for irrigating the Municipal Golf Course and Riverview Park area. An additional storage pond will be required to provide storage necessary to allow for irrigating the areas east and west of the Pecos River (Lake Carlsbad). The reuse

storage pond will require a minimum volume to serve as a water feature and a working volume of 983,700 gallons for irrigation. The reuse storage pond will need to be lined and can be located at the west end of the golf course. An additional lined storage pond should be considered on the east side of the new storage pond and piping to receive reuse water from the WWTP.

4.b.7 New Reuse Irrigation Pump Station

A second reuse irrigation pump station is required to irrigate the additional parks along the Pecos River. The pump station shall be sized to handle the 8-hour pumping rate of 1,276 gpm with provisions to pump a future flow of 2,050 gpm and be located adjacent to the west reuse storage pond.

4.b.8 New Effluent Reuse Irrigation Pipelines

Improvements to the existing irrigation – For the Northeast area, piping is already in place to irrigate the Municipal Golf Course. The Par 3 and Riverview Park areas are already irrigated using reuse water but are inefficient due to the distribution line sizes. There is a 10-inch stub-out on the 10-inch golf course irrigation loop line intended to connect the Par 3 and Riverview Park irrigation system to in order to adequately irrigate these areas, see Figure 9 for irrigation pipelines and sizes. A new 10-inch loop line should be installed at the golf course to improve irrigation.

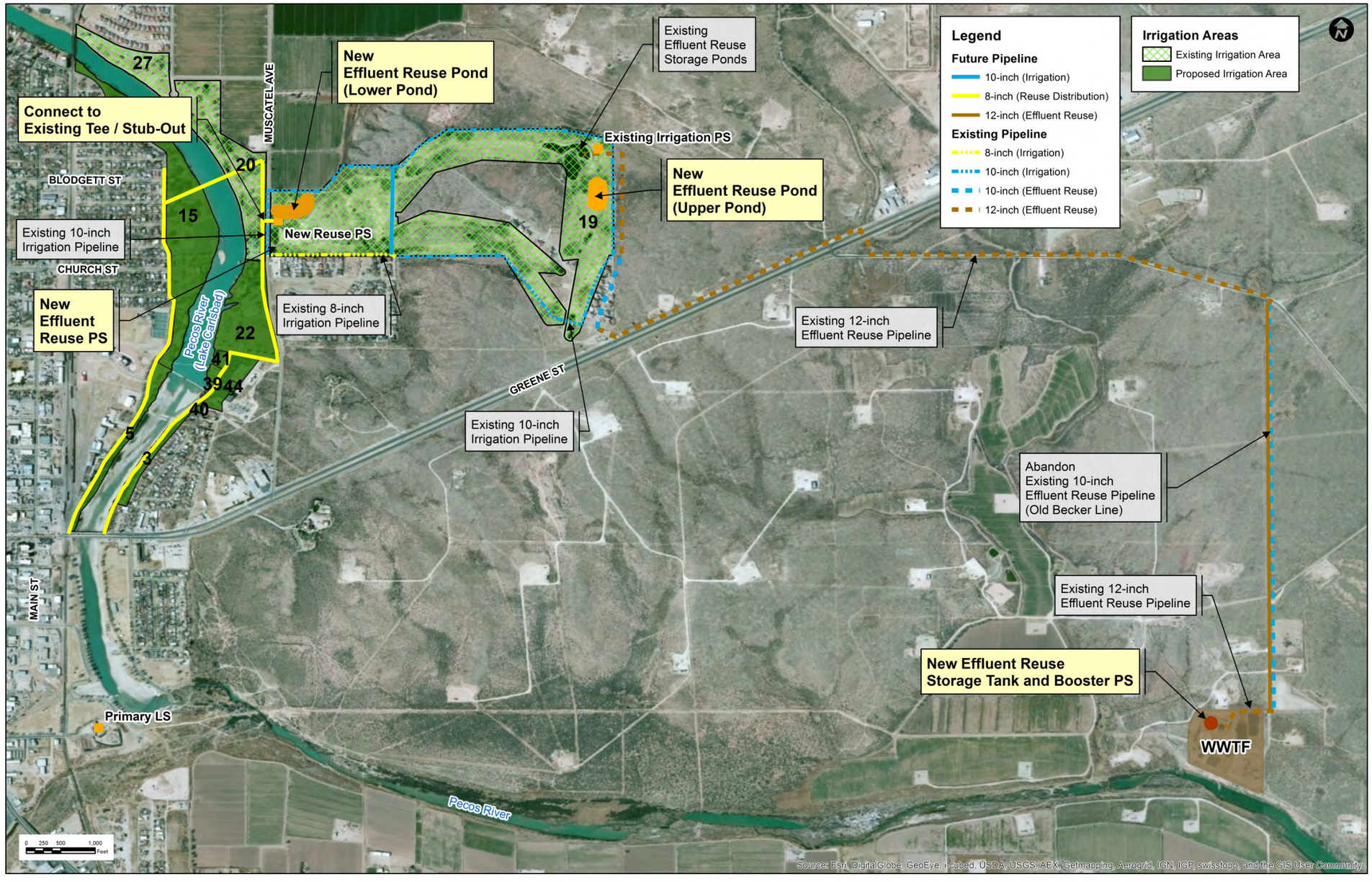
River Crossing – There will need to be a crossing under the Pecos River (Lake Carlsbad) to irrigate the Northwest area. It was considered to cross the Pecos River on the north end by attaching the pipeline to the BNSF railroad bridge but BNSF did not allow the City to do so. Another possibility is crossing at the La Huerta Bridge but it is further north and would require a longer pipeline. Trenchless technologies do not appear to be an option to cross near the railroad bridge, as the river is approximately 20 feet deep and is on rock. NMDOT was contacted regarding the potential for hanging the reuse pipeline along the bridge crossing at Green Street. NMDOT is currently in the process of performing load ratings for bridges throughout the state and has indicated one has not been performed for this bridge (bridge number 1838). In order for NMDOT to consider allowing the reuse pipeline to be suspended from the bridge, NMDOT would require the utility owner to perform and provide the load rating of the bridge along with recommendations by a structural bridge engineer. All connection details would need to be coordinated with NMDOT and conform to NMDOT's Bridge Design Guide. NMDOT would prefer not to add the additional dead load of the waterline to the existing bridge. In addition, according to NMDOT, the bridge is in need of major reconstruction in the near future. The extent of the reconstruction is unknown at the moment but would affect the reuse pipeline. Considering the above, it is recommended that the proposed crossing be completed near the Par 3 under the river using trenchless technologies. A 404 permit may be required by the U.S. Army Corps of Engineers (USACE) for installation of the pipeline crossing the river.

Irrigation Pipelines – All other reuse pipelines along the parks will follow existing City streets.

c) Map

The proposed location map for Alternative 1 – North system is shown on Figure 11.

Figure 11. North System Location Map with Land Application Sites



d) Environmental Impacts

An Environmental Information Document has been prepared and is provided under separate cover.

e) Land Requirements

There are no additional land requirements anticipated for this alternative as all work will be performed within the limits of the WWTF property, Municipal Golf Course, City parks and established easements. The easement through BLM land to upsize the reuse pipeline will need to be amended.

f) Potential Construction Problems

Potential construction challenges with this alternative involve rock excavation at the WWTF and high groundwater near the Pecos River. Soil investigations will need to be performed during the design phase. The areas within City streets will also require coordinating with the utilities companies to determine the final pipeline alignments and will require traffic control throughout the streets during construction. In addition, the existing forcemain to be upsized is AC pipe and proper construction techniques and disposal procedures will need to be followed when encountering such pipe during construction.

g) Sustainability Considerations

iv) Water and Energy Efficiency

The purpose of this project is to reduce the use of potable water for irrigation purposes by using wastewater effluent.

v) Green Infrastructure

This section is not applicable.

vi) Other

With this alternative, there is approximately 19.0 acre-feet of additional reuse water available. The City has been approached about selling reuse water for use in fracking operations being conducted by the oil and gas industry in the area. Should the City decide to sell the reuse water, the purchaser would have to obtain a ground water discharge permit specific for the purchaser's intended use. The purchaser would be required to perform all monitoring and reporting just as the City does. The City's responsibility lies with producing reuse water that meets the intended use as required by the purchaser's groundwater discharge permit. This may not be an option to the City as it does not meet the intention of the reuse program to reduce the use of potable water, to do so would likely require approval by the Water and Sewer board. If the City decides to pursue this option, considerations will need to be made due to the added complexity in providing treated effluent to meet the customer's needs along with a reuse water filling station. It is anticipated that the project will be constructed in phases in which the current available water could be sold rather than returning to the river until the irrigation system is fully extended.

h) Cost Estimates

The following estimate of probable costs was developed using the most updated cost estimating guides and from recent construction costs from similar projects. Estimated costs were also obtained from various equipment manufacturers and vendors. All cost estimates in this report are for comparison purposes only and should be refined during completion of detailed final design.

Table 15. Alternative 2 – North System Estimated Probable Costs

Component	Probable Cost
Mobilization, Demobilization Bonds and Permits	$548,000
Modifications to Existing Reuse Pump Station	$227,700
Chlorine Injection (Sodium Hypochlorite)	$140,400
Reuse Storage Tank	$1,242,000
Reuse Transfer Pump Station	$382,250
Increase Size of Reuse Pipeline Section	$356,500
West Reuse Storage Pond	$129,950
East Reuse Storage Pond	$92,460
New Reuse Irrigation Pump Station	$888,250
Reuse Irrigation Pipelines	$924,395
Subtotal	**$4,931,905**
Contingency @ 30%	$1,479,572
Total Estimated Construction Costs	**$6,411,477**
Engineering @ 10%	$641,148
Survey & Geotechnical @ 3%	$192,344
Construction Observation Services @ 4%	$256,459
Project Administration @ 1%	$64,115
Subtotal Total Estimated Costs	**$7,565,542**
NMGRT @ 7.4375%	$562,687
Total Estimate of Probable Costs	**$8,128,229**

The following estimate of probable annual operations and maintenance (O&M) costs was developed using information obtained from various equipment manufacturers and vendors. Estimate of probable O&M costs are for comparison purposes only and should be refined during detailed design for all O&M cost estimates in this report.

Table 16. Alternative 2 – North System Estimated Probable O&M Costs

Component	Probable Cost (year)
Maintenance Materials	$6,000
Labor	$14,600
Chemical (Sodium Hypochlorite)	$17,200
Electrical	$5,840
Total Estimate of Probable Costs	**$43,640**

4.3 Alternative 3 – South System

a) Description

Alternative 3 includes providing reuse water for the irrigation sites south of Green Street which would include the parks along the Pecos River (Lake Carlsbad) as well as the City Cemetery to the west. The irrigation sites and associated reuse water demands for these areas are summarized in Table 17.

Table 17. Alternative 3 – South System Irrigation Sites

Map Key	Irrigation Site	Area (acres)	Average Daily Demand of 9,000 gal/acre (g/day)	Equivalent 8-Hour Pumping Rate (gpm)
South Service Area				
4	Bataan Recreational Area – South	41.3	371,700	774
37	MLK Memorial Park	7.9	71,100	148
24	Plaza Del San Jose Park - North	3.7	33,300	69
25	Plaza Del San Jose Park - South	3.7	33,300	69
10	Cruz Fernandez Park	3	27,00	56
45	Carlsbad Cemetery	68	612,000	1,275
South Service Area Totals		**127.6**	**1,148,400**	**2,393**

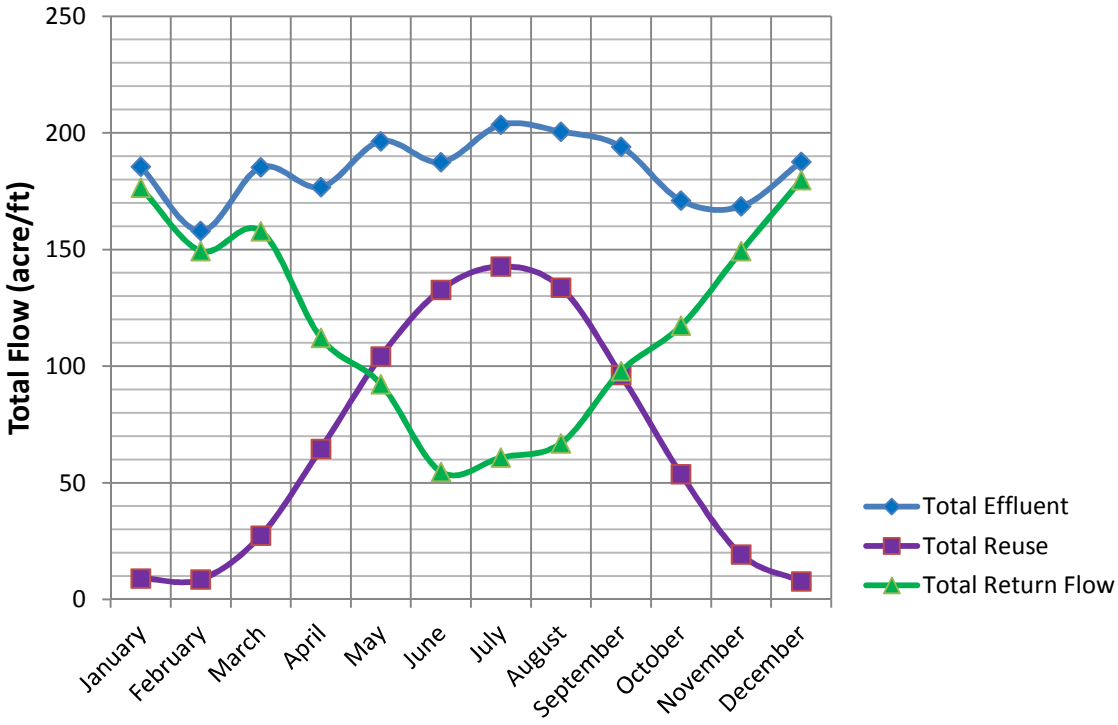
The proposed additional irrigation sites comprise a total of 127.6 acres. As such, there would not be enough reuse water available to irrigate the entire south system. As previously calculated, there is enough reuse water available to irrigate an additional 114.5 acres meaning some of the smaller parks would need to be excluded until additional reuse water becomes available in the future. Although all of the sites would not be able to be irrigated, all of the available reuse water can be used. Water quantities were updated assuming a total of 114.5 acres would be irrigated and are summarized in Table 18.

Table 18. Alternative 3 – South System Water Quantities

Month	Effluent (acre-feet)	Current Reuse (acre-feet)	Additional Reuse (acre-feet)	Return Flow (acre-feet)
January	185.56	9.05	0.00	176.51
February	157.95	8.58	0.00	149.36
March	185.28	27.39	0.00	157.88
April	176.76	46.09	18.51	112.16
May	196.42	49.77	54.39	92.26
June	187.41	52.34	80.35	54.72
July	203.50	44.41	98.29	60.80
August	200.53	47.94	85.69	66.90
September	194.06	37.63	58.59	97.84
October	171.01	34.52	19.18	117.31
November	168.49	19.24	0.00	149.25
December	187.56	7.76	0.00	179.80
Yearly Totals	**2,214.52**	**384.71**	**415.00**	**1,414.81**

Based on the quantities summarized on Table 18, all of the available reuse water is being used. The total effluent flow, seasonal irrigation demand flow and return flow for the proposed south system is shown on Figure 12.

Figure 12. North System Yearly Irrigation and Return Flows



b) Design Criteria

The following improvements and additional facilities are required for the south system:

- Modifications to existing reuse pump station
- New chlorine injection facility
- New reuse transfer pump station
- New reuse storage tank
- New reuse irrigation pump station
- Slipline existing 24-inch forcemain
- New reuse irrigation pipelines

Descriptions of the improvements and additional facilities are based on the design criteria explained in the following subsections.

4.b.1 Modifications to Existing Reuse Pump Station

The existing reuse pumps are over 15 years of age and should be considered for replacement along with adding a third reuse pump to provide additional redundancy.

4.b.2 New Chlorine Injection Facility

A liquid sodium hypochlorite feed system to inject chlorine in the reuse water is recommended as described in Alternative 2 which includes chemical storage,

chemical feed pumps and appurtenances, piping, valves, instrumentation and controls and would be located at the WWTF. The chemical feed system should include dosage control and be sized to provide a chlorine residual between 2 to 5 mg/l at the pump station.

4.b.3 New Reuse Transfer Pump Station

A new reuse transfer pump station will be required to pump treated effluent from the reuse wet well to the new storage tank. There is sufficient area adjacent to the reuse wet well for the new transfer pump station. The pump station will be sized to handle the daily flows and shall include all necessary valves, piping, instrumentation and controls.

4.b.4 New Reuse Storage Tank

Typically, wastewater flows are higher in the day and low flow occurring during the night while irrigation occurs during the night to limit public exposure. A typical 24 hour scenario would be to fill storage constantly all day and irrigate during the night. At the WWTF, the reuse pump station wet well contains some storage capacity but serves more as a buffer for the peak daily flows. Additional storage at the WWTF is required to store treated effluent during the day when higher flows are experienced. A 1.15 MG storage tank will be required at the area near the Primary Lift Station to provide the storage for the daily irrigation demand flow.

4.b.5 Reuse Irrigation Pump Station

A reuse irrigation pump station will be required at the WWTF to irrigate the South system. It is proposed to locate the reuse irrigation pump state at the WWTF adjacent to the reuse storage tank. The reuse pump station will be sized to handle the 8-hour pumping rate of 2,393 gpm. A new electrical service drop will be required for the reuse pump station to handle the large electrical load.

4.b.6 Slipline Abandoned Influent Forcemain

The abandoned influent forcemain from the Primary LS to the WWTF could be used to convey reuse water down to the south area, however, the existing 24-inch PCCP pipeline was constructed with the original WWTF in the late 1960's. PCCP consists of a concrete core, steel cylinder, high tensile pre-stressing wires and a mortar coating. These pipelines tend to have failures due to corrosion of the pre-stressing wires which can be catastrophic and costly. Due to the age of the pipe, it is recommended that the existing PCCP be sliplined with an 18-inch HDPE pipe.

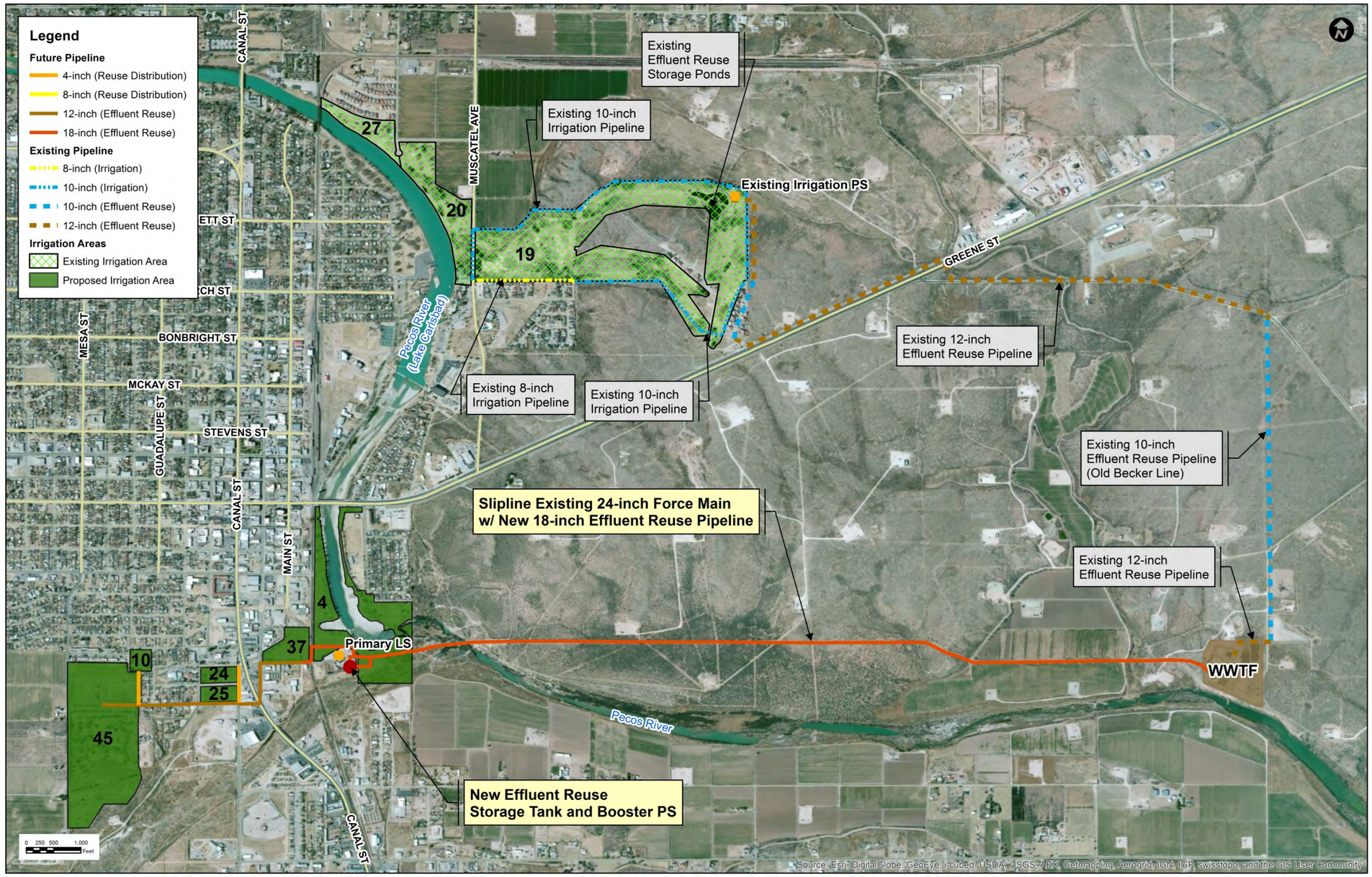
4.b.7 Effluent Reuse Distribution

Reuse pipelines will need to be extended from the Primary LS to each of the irrigation sites, see Figure 13.

c) Map

The proposed location map for Alternative 3 – South system is shown on Figure 13.

Figure 13. South System Location Map with Land Application Sites



d) Environmental Impacts

An Environmental Information Document has been prepared and provided under separate cover.

e) Land Requirements

There are no additional land requirements anticipated for this alternative as all work will be performed within the limits of the WWTF property, City parks, established easements and City streets. Additional easements will be required to cross Green Street (NMDOT) and the BNSF Railroad. There is an easement for the existing forcemain between the Primary Lift Station and the WWTF which is provided in Appendix D.

f) Potential Construction Problems

Potential construction challenges with this alternative involve rock excavation at the WWTP and high groundwater near the Pecos River. Soil investigations will need to be performed during the design phase. The areas within City streets will also require coordinating with the utilities companies to determine the final pipeline alignments and will require traffic control throughout the streets during construction.

g) Sustainability Considerations

vii) Water and Energy Efficiency

The purpose of this project is to reduce the use of potable water for irrigation purposes by using wastewater effluent.

viii) Green Infrastructure

This section is not applicable.

ix) Other

There are no other considerations for this alternative.

h) Cost Estimates

The estimated probable cost estimate for this alternative is summarized on Table 19 and estimated probable O&M costs are provided on Table 20.

Table 19. Alternative 3 – South System Estimated Probable Costs

Component	Probable Cost
Mobilization, Demobilization Bonds and Permits	$595,000
Modifications to Existing Reuse Pump Station	$187,450
Chlorine Injection (Sodium Hypochlorite)	$140,400
Reuse Storage Tank	$732,550
Reuse Transfer Pump Station	$480,000
Reuse Irrigation Pump Station	$888,250
Slipline Existing Forcemain	$1,308,600
Reuse Irrigation Pipelines	$1,025,455
Subtotal	**$5,357,705**
Contingency @ 30%	$1,607,312
Total Estimated Construction Costs	**$6,965,017**
Engineering @ 10%	$696,502
Survey & Geotechnical @ 3%	$208,950
Construction Observation Services @ 4%	$278,601
Project Administration @ 1%	$69,650
Subtotal Total Estimated Costs	**$8,218,719**
NMGRT @ 7.4375%	$611,267
Total Estimate of Probable Costs	**$8,829,987**

Table 20. Alternative 3 – South System Estimated Probable O&M Costs

Component	Probable Cost (year)
Maintenance Materials	$8,000
Labor	$14,600
Chemical (Sodium Hypochlorite)	$21,680
Electrical	$10,680
Total Estimate of Probable Costs	**$54,960**

4.4 Alternative 4 – Lake Carlsbad System

a) Description

Alternative 4 includes providing reuse water for the additional irrigation sites along both sides of the Pecos River (Lake Carlsbad). The irrigation sites and associated reuse water demands for these areas are summarized in Table 21.

Table 21. Alternative 4 – Lake Carlsbad System Irrigation Sites

Map Key	Irrigation Site	Area (acres)	Average Daily Demand of 9,000 gal/ac (gal)	Equivalent 8-Hour Pumping Rate (gpm)
Lake Carlsbad System				
4	Bataan Recreational Area – South	41.3	371,700	774
5	Bataan Recreational Area – West	4.7	42,300	88
3	Bataan Recreational Area – East	4.9	44,100	92
15	Lake Carlsbad Recreation Area	34	306,000	638
40	Millennium Park	0.2	1,800	4
39	Alejandro Ruiz Memorial Park	0.1	900	2
44	Alejandro Ruiz Memorial Skate Park (Not Irrigated)	-	0	0
41	Playground On the Pecos	0.8	7,200	15
22	Pecos River Village Recreation Area	23.3	209,700	437
	Totals	**109.3**	**983,700**	**2,050**

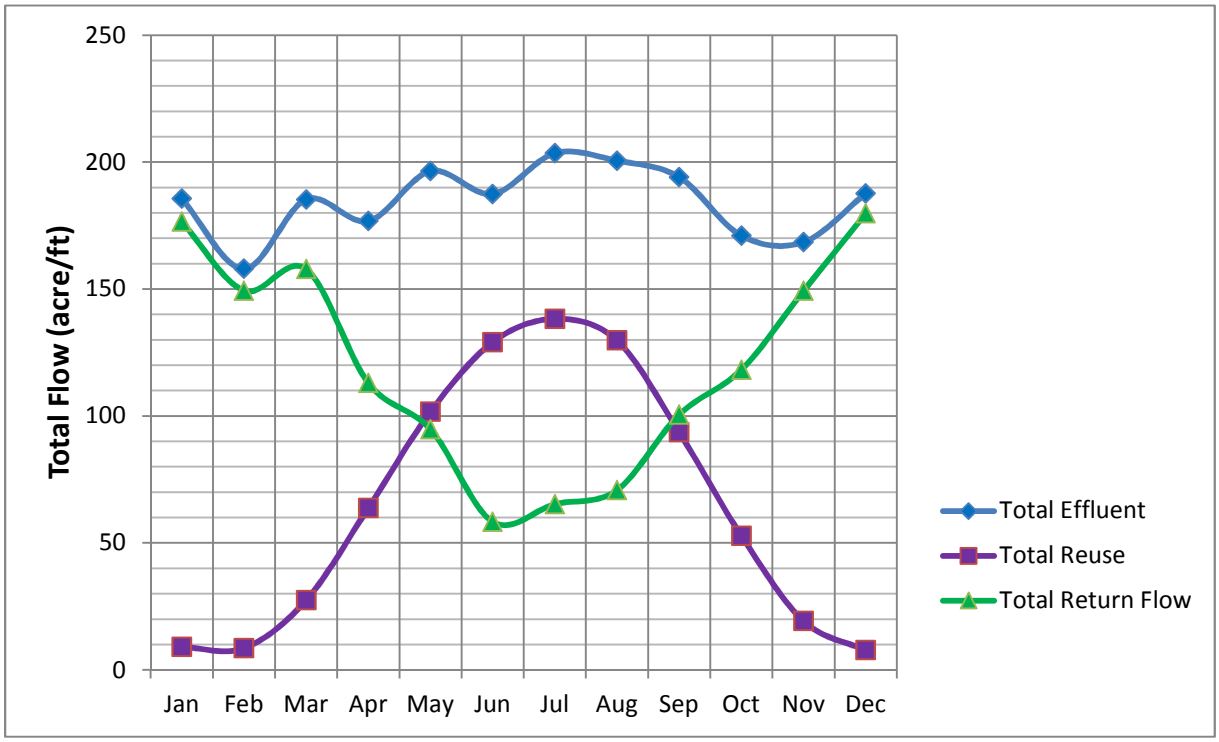
The proposed additional irrigation sites comprise a total of 109.3 acres in which previously calculated, there is enough reuse water available to irrigate an additional 114.5 acres. Quantities were updated and are summarized in Table 18.

Table 22. Alternative 4 – Lake Carlsbad System Water Quantities

Month	Effluent (acre-feet)	Current Reuse (acre-feet)	Additional Reuse (acre-feet)	Return Flow (acre-feet)
January	185.56	9.05	0.00	176.51
February	157.95	8.58	0.00	149.36
March	185.28	27.39	0.00	157.88
April	176.76	46.09	17.70	113.00
May	196.42	49.77	51.92	94.73
June	187.41	52.34	76.70	58.37
July	203.50	44.41	93.82	65.27
August	200.53	47.94	81.80	70.79
September	194.06	37.63	55.93	100.50
October	171.01	34.52	18.31	118.18
November	168.49	19.24	0.00	149.25
December	187.56	7.76	0.00	179.80
Yearly Totals	**2,214.52**	**384.71**	**396.15**	**1,433.65**

Based on the quantities summarized on Table 22, all of the available reuse water is being used. The total effluent flow, seasonal irrigation demand flow and return flow for the proposed south system is shown on Figure 14.

Figure 14. Lake Carlsbad System Yearly Irrigation and Return Flows



b) Design Criteria

The following improvements and additional facilities are required for the south system:

- Modifications to existing reuse pump station
- New chlorine injection facility
- New reuse transfer pump station
- New reuse storage tank
- New reuse irrigation pump station
- Slipline existing 24-inch forcemain
- New reuse irrigation pipelines

Descriptions of the improvements and additional facilities are based on the design criteria explained in the following subsections.

4.b.1 Modifications to Existing Reuse Pump Station

The existing reuse pumps are over 15 years of age and should be considered for replacement along with adding a third reuse pump to provide additional redundancy.

4.b.2 New Chlorine Injection Facility

A liquid sodium hypochlorite feed system to inject chlorine in the reuse water is recommended as described in Alternative 2 which includes chemical storage, chemical feed pumps and appurtenances, piping, valves, instrumentation and

controls and would be located at the WWTF. The chemical feed system should include dosage control and be sized to provide a chlorine residual between 2 to 5 mg/l at the pump station.

4.b.3 New Reuse Transfer Pump Station

A new reuse transfer pump station will be required to pump treated effluent from the reuse wet well to the new storage tank. There is sufficient area adjacent to the reuse wet well for the new transfer pump station. The pump station will be sized to handle the daily flows and shall include all necessary valves, piping, instrumentation and controls.

4.b.4 New Reuse Storage Tank

Typically, wastewater flows are higher in the day and low flow occurring during the night while irrigation occurs during the night to limit public exposure. A typical 24 hour scenario would be to fill storage constantly all day and irrigate during the night. At the WWTF, the reuse pump station wetwell contains some storage capacity but serves more as a buffer for the peak daily flows. Additional storage at the WWTF is required to store treated effluent during the day when higher flows are experienced. A 1.0 MG storage tank will be required at the area near the Primary Lift Station provide the storage for the daily irrigation demand flow.

4.b.5 Reuse Irrigation Pump Station

A reuse irrigation pump station will be required to irrigate the South system. It is proposed to locate the reuse irrigation pump state at the WWTF adjacent to the reuse storage tank. The reuse pump station will be sized to handle the 8-hour pumping rate of 2,050 gpm. A new electrical service drop will be required for the reuse pump station to handle the large electrical load.

4.b.6 Slipline Abandoned Influent Forcemain

The abandoned influent forcemain from the Primary LS to the WWTF could be used to convey reuse water down to the south area, however, the existing 24-inch PCCP pipeline was constructed with the original WWTF in the late 1960's. PCCP consists of a concrete core, steel cylinder, high tensile pre-stressing wires and a mortar coating. These pipelines tend to have failures due to corrosion of the pre-stressing wires which can be catastrophic and costly. Due to the age of the pipe, it is recommended that the existing PCCP be sliplined with an 18-inch HDPE pipe.

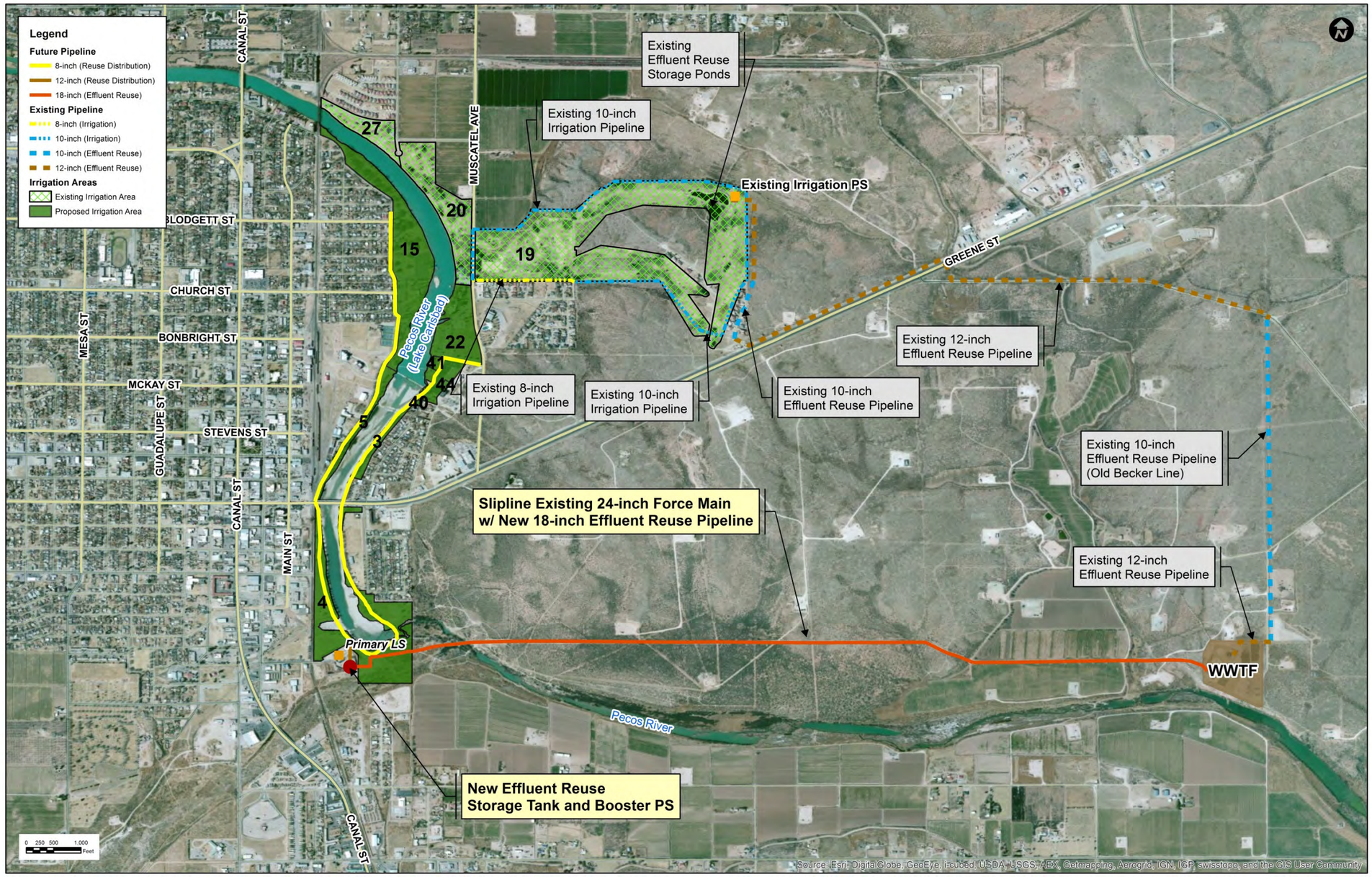
4.b.7 Effluent Reuse Distribution

Reuse pipelines will need to be extended from the Primary LS to each of the irrigation sites, see Figure 13.

4.b.8 Map

The proposed location map for Alternative 4 – South system is shown on Figure 15.

Figure 15. Lake Carlsbad System Location Map with Land Application Sites



c) Environmental Impacts

An Environmental Information Document has been prepared and is provided under separate cover.

d) Land Requirements

There are no additional land requirements anticipated for this alternative as all work will be performed within the limits of the WWTF property, City parks, established easements and City streets. Additional easements will be required to cross Green Street (NMDOT).

e) Potential Construction Problems

Potential construction challenges with this alternative involve rock excavation at the WWTP and high groundwater near the Pecos River. Soil investigations will need to be performed during the design phase. The areas within City streets will also require coordinating with the utilities companies to determine the final pipeline alignments and will require traffic control throughout the streets during construction.

f) Sustainability Considerations

x) Water and Energy Efficiency

The purpose of this project is to reduce the use of potable water for irrigation purposes by using wastewater effluent.

xi) Green Infrastructure

This section is not applicable.

xii) Other

There are no other considerations for this alternative.

g) Cost Estimates

The estimated probable cost estimate for this alternative is summarized on Table 23 and estimated probable O&M costs are provided on Table 24.

Table 23. Alternative 4 – Lake Carlsbad System Estimated Probable Costs

Component	Probable Cost
Mobilization, Demobilization Bonds and Permits	$617,000
Modifications to Existing Reuse Pump Station	$187,450
Chlorine Injection (Sodium Hypochlorite)	$140,400
Reuse Storage Tank	$661,250
Reuse Transfer Pump Station	$480,000
Reuse Irrigation Pump Station	$888,250
Slipline Existing Forcemain	$1,308,600
Reuse Irrigation Pipelines	$1,267,070
Subtotal	**$5,550,020**
Contingency @ 30%	$1,665,006
Total Estimated Construction Costs	**$7,215,026**
Engineering @ 10%	$721,503
Survey & Geotechnical @ 3%	$216,451
Construction Observation Services @ 4%	$288,601
Project Administration @ 1%	$72,150
Subtotal Total Estimated Costs	**$8,513,731**
NMGRT @ 7.4375%	$633,209
Total Estimate of Probable Costs	**$9,146,939**

Table 24. Alternative 4 – Lake Carlsbad System Estimated Probable O&M Costs

Component	Probable Cost (year)
Maintenance Materials	$8,000
Labor	$14,600
Chemical (Sodium Hypochlorite)	$21,680
Electrical	$10,680
Total Estimate of Probable Costs	**$54,960**

5.0 Selection of an Alternative

a) Life Cycle Cost Analysis

Life cycle costs were analyzed by using a 20-year life cycle with a "real" discount rate of 1.6% as taken from the Office of Management and Budget (OMB) circular A-94 http://www.whitehouse.gov/omb/circulars_a094/a94_appx-c. Capital costs include construction and non-construction items such as engineering costs. Annual O&M costs were converted to present day dollars using the uniform series present worth calculations. The Net Present Value was calculated as the sum of the Capital Cost (C) plus the present worth of the uniform series of annual O&M (USPW (O&M)) costs minus the single payment present worth of the salvage value (SSPW(S)):

$$NPV = C + USPW (O\&M) – SSPW (S)$$

The following table summarizes the life cycle costs:

Table 25. Summary of Cost Analysis

Alternative 1 – No Action	
Total Annual O&M Cost	$0
USPW O&M Costs (20-year life cycle @ 1.6%)	$0
Total Capital Cost	$0
Salvage Cost (Assumed none after 20 years)	$0
Net Present Value (20-year life cycle)	**$0**
Alternative 2 – North System	
Total Annual O&M Cost	$43,640
USPW O&M Costs (20-year life cycle @ 1.6%)	$741,905
Total Capital Cost	$8,128,229
Salvage Cost (Assumed none after 20 years)	$0
Net Present Value (20-year life cycle)	**$8,870,134**
Alternative 3 – South System	
Total Annual O&M Cost	$54,960
USPW O&M Costs (20-year life cycle @ 1.6%)	$934,352
Total Capital Cost	$8,829,987
Salvage Cost (Assumed none after 20 years)	$0
Net Present Value (20-year life cycle)	**$9,764,339**
Alternative 4 – Lake Carlsbad System	
Total Annual O&M Cost	$54,960
USPW O&M Costs (20-year life cycle @ 1.6%)	$934,352
Total Capital Cost	$9,146,939
Salvage Cost (Assumed none after 20 years)	$0
Net Present Value (20-year life cycle)	**$10,081,291**

b) Non-Monetary Factors

A matrix rating system was compiled to compare alternatives based on cost and Non-Monetary factors. Factors were weighted from 1 to 10 for each alternative with the highest total being the preferred alternative for the following:

- Capital Cost – Estimated probable cost
- O&M Costs – Estimated annual operations & maintenance cost
- Improvement to Existing Reuse Infrastructure
- Sustainability Considerations – Maximizing amount of water available reuse
- Direct Benefit to the Community – Irrigating public parks
- Construction Phasing

Table 26. Matrix Rating System

Factor	Alternative 1 No Action	Alternative 2 South System	Alternative 3 North System	Alternative 4 Lake Carlsbad System
Capital Cost	10	9	7	8
O&M Costs	10	9	8	8
Improvement to Existing Reuse Infrastructure	0	10	9	8
Sustainability Considerations (Utilizing 100% Available Reuse)	5	9	10	10
Direct Benefit to the Community	5	10	8	10
Construction Phasing	10	9	7	7
Total Score	**40**	**56**	**49**	**51**

Based on the matrix rating system, Alternative 2 is the preferred alternative.

6.0 Proposed Project (Recommended Alternative)

As described in the preceding sections, the recommended alternative is the preferred Alternative No. 2 to make improvements to the existing reuse system and extend the reuse system to provide reuse water for new irrigation sites on both side of the Pecos River north of Green Street.

a) Preliminary Project Design

The following improvements and additional facilities are required for the North System. Pump flow rates

- Replace two existing reuse pumps and install third reuse pump (2 duty, 1 standby), modify suction piping and repaint pump station. Reuse pumps sized to handle 2.0 mgd or 1,400.
- New chemical feed system located at WWTF, rehab old chlorine building to house chemical storage, chemical feed pumps and appurtenances, piping, valves, instrumentation and controls to be sized to provide a chlorine residual at the end of the pipe and be provided with adjustable dosage control.
- New reuse transfer pump station sized to handle the varying daily flows to pump treated effluent from the reuse wet well to the new storage tank located at the WWTF site. Transfer pump station should include all necessary valves, piping, instrumentation and controls. Transfer pumps should include variable frequency drives to pump the varying flows. Diurnal flows at the WWTF should be reviewed during detailed design to determine the varying pumping rates.
- New minimum 2.0 MG reuse storage tank located at the WWTF.
- Increase 10-inch reuse pipeline segment (Old Becker) to 12-inch diameter.
- New lined reuse storage ponds located at the Municipal Golf Course with a minimum working volume of 983,700 gallons for the east pond for storage to irrigate the additional storage areas. Storage ponds should follow the conceptual drawings prepared for Lake Carlsbad Municipal Golf Course Master Plan dated July 23, 2003 provided in Appendix E.
- New reuse irrigation pump station sized to pump 1,276 gpm with provisions to pump a future flow of 2,050 gpm. Irrigation pump station to be located at the Municipal Golf Course to irrigate the additional parks along the Pecos River (Lake Carlsbad).
- Improve reuse pipeline sizes for Par 3 and Riverview Park and install new irrigation pipelines along east and west side of Pecos River (Lake Carlsbad) along with the river crossing near Par 3.

b) Project Schedule

The proposed project schedule is as follows:

- Design – 6 to 8 months
- Approval of bid documents – 1 month
- Construction bidding, evaluation and award – 1 to 2 months
- Construction – 8 to 12 months
- Startup and project closeout – 1 month

c) Permit Requirements

The City has an existing groundwater permit which allows them to irrigate the Municipal Golf Course, parks and City cemetery. Construction permits and easements will be required for work in NMDOT highways, BNSF property and a USACE 404 permit for crossing the Pecos River. The easement through BLM land will need to be amended when upsizing the pipeline.

d) Sustainability Considerations

i) Water and Energy Efficiency

The purpose of this project is to conserve potable water by reusing treated effluent for irrigation.

ii) Green Infrastructure

This section is not applicable.

iii) Other

The City should consider the benefits in selling reuse water for the use as fracking water. A filling station with a meter would need to be constructed in order to fill tanker trucks.

7.0 Conclusions and Recommendations

The City possesses a valuable asset in reuse water that can be used to preserve potable water by expanding the reuse program. The WWTF treats the City's wastewater to water quality standards suitable for reuse water, which is already being used to irrigate the Municipal Golf Course and Riverview Park. It is recommended to proceed with implementing improvements to the existing reuse infrastructure and further extending the system to include irrigation of additional City parks along the Pecos River (Lake Carlsbad) north of Green Street. Detailed design of the proposed infrastructure should be performed prior to construction of any new facilities. Preliminary sizing of the proposed system has been sized to further extend reuse to irrigation the Bataan Recreation Area south of Green Street. In order to meet funding constraints, the project can be phased in the following order. Individual components within the phasing plan may be removed or added into other phasing to accommodate funding. The phasing can be modified in order to meet the City's needs, however, Phase I and Phase II must be completed before Phase III.

Phase I – Improvements to the Existing Reuse Infrastructure

- Modifications to existing reuse pump station
- Chlorine injection at WWTF
- Improvements to existing irrigation at golf course
- Increase size of existing 10" pipeline to 12"
- Irrigation pipelines to connect Par 3 and Riverview Park to existing irrigation loop line and install irrigation loop at golf course.
- Estimated probable cost – $1,879,805

Phase II – Reuse Infrastructure at WWTF

- 2.0 MG reuse storage tank
- Reuse transfer pump station
- Estimated probable cost – $3,009,827

Phase III – Extend Reuse Infrastructure to west side of Pecos River

- East and West reuse storage ponds at golf course
- Reuse booster pump station
- Irrigation pipelines and river crossing
- Estimated probable cost – $3,238,598

It is recommended that a geotechnical investigation be completed to determine sub surface conditions early in the design phase.

Appendix A
Groundwater Discharge Permit

NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

Harold Runnels Building
1190 St. Francis Drive
P.O. Box 5469, Santa Fe, NM 87502-5469
Phone (505) 827-2918 Fax (505) 827-2965
www.nmenv.state.nm.us

RYAN FLYNN
Secretary-Designate
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

November 12, 2013

Harry Burgess, City Administrator
Carlsbad Wastewater Treatment Facility
P.O. Box 1569
Carlsbad, NM 88221-1569

RE: Draft Discharge Permit Renewal and Modification, DP-1274, Carlsbad Wastewater Treatment Facility

Dear Mr. Burgess:

Notice is hereby given pursuant to Subsection H of 20.6.2.3108 NMAC that Ground Water Discharge Permit DP-1274, Carlsbad Wastewater Treatment Facility, has been proposed for approval (copy enclosed). The New Mexico Environment Department (NMED) will publish notice of the availability of the draft Discharge Permit in the near future and will forward a copy of the notice to you.

Prior to making a final ruling on the proposed Discharge Permit, NMED will allow 30 days from the date the public notice is published during which time written comments can be submitted and/or a public hearing requested. Comments and/or hearing requests may be submitted by any interested person, including the Discharge Permit applicant. Written comments and/or hearing requests must be submitted to the Ground Water Quality Bureau at the address above and shall set forth the reasons why a hearing is requested. A hearing will be held only if hearing requests are received from the public and/or the Discharge Permit applicant during the 30-day comment period and NMED determines there is substantial public interest in the proposed Discharge Permit. Hearings are presided over by the NMED Secretary or a hearing officer appointed by the Secretary.

Please review the enclosed draft Discharge Permit carefully for accuracy and completeness, and to make sure you understand what it requires. Please be aware that this Discharge Permit may contain conditions that require the permittee to implement operational, monitoring or closure actions by a specified deadline. Such conditions are listed at the beginning of the operational, monitoring and closure plans of this Discharge Permit.

A copy of the Water Quality Control Commission (WQCC) Regulations, 20.6.2 NMAC, is available at http://www.nmcpr.state.nm.us/nmac/_title20/T20C006.htm.

If you have any comments, questions, or concerns, please contact me at (505) 827-2978. If written comments and/or a written request for hearing are not received during the public comment period, the draft Discharge Permit will become final. Thank you for your cooperation during the review process.

Sincerely,

Russell A. Isaac

Russell A. Isaac, Ph.D.
Environmental Engineer

enc: Draft Discharge Permit Renewal and Modification, DP-1274
Ground Water Discharge Permit Conditions for Synthetically Lined Lagoons – Liner Material and Site Preparation, Revision 0.0, May 2007
Land Application Data Sheet (LADS; also available at the following website: http://www.nmenv.state.nm.us/gwb/forms/NewMexicoEnvironmentDepartment-GroundWaterQualityBureau-Forms.htm)
Fertilizer Log

cc: Art Sena, Wastewater Superintendent, P.O. Box 1569 Carlsbad, NM 88221-1569 (draft permit w/ enclosures)

GROUND WATER DISCHARGE PERMIT RENEWAL AND MODIFICATION
City of Carlsbad Wastewater Treatment Facility, DP-1274

I. INTRODUCTION

The New Mexico Environment Department (NMED) issues this Discharge Permit Renewal and Modification, DP-1274, to the City of Carlsbad (permittee) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations, 20.6.2 NMAC.

NMED's purpose in issuing this Discharge Permit, and in imposing the requirements and conditions specified herein, is to control the discharge of water contaminants from City of Carlsbad Wastewater Treatment Facility (WWTF) (facility) into ground and surface water, so as to protect ground and surface water for present and potential future use as domestic and agricultural water supply and other uses and protect public health. In issuing this Discharge Permit, NMED has determined that the requirements of Subsection C of 20.6.2.3109 NMAC have been or will be met. Pursuant to Section 20.6.2.3104 NMAC, it is the responsibility of the permittee to comply with the terms and conditions of this Discharge Permit; failure may result in an enforcement action(s) by NMED (20.6.2.1220 NMAC).

The activities which produce the discharge, the location of the discharge, and the quantity, quality and flow characteristics of the discharge are briefly described as follows:

Up to 6.5 million gallons per day (MGD) of domestic wastewater is received and treated using an activated sludge WWTF. Treated wastewater (reclaimed wastewater) is stored and used for a variety of purposes. These include

- Irrigation of approximately 563 acres of city owned parks, its cemetery, its golf course and landscaped areas at the WWTF
- Temporary uses and process/wash water at the facility.

Alternatively, treated wastewater is discharged directly to the Pecos River under National Discharge Elimination System (NPDES) Permit # NM0026395. The modification consists of listing the location and areas of land being irrigated. The discharge contains water contaminants or toxic pollutants, which may be elevated above the standards of 20.6.2.3103 NMAC. The WWTF is located at 45 Blackfoot Rd (now Telltale Lane), Carlsbad in Section 7, T22S, R27E, Eddy County, approximately three miles east-southeast of Carlsbad. Irrigation and other uses take place in Sections 25 and 26, T21S, R26E; Sections 31-33, T21S, R27E; Sections 5-7, 9 and 10, T22S R27E. Ground water below the sites ranges in depth from approximately 8 to 85 feet and has a total dissolved solids concentration of approximately 952 milligrams per liter.

The original Discharge Permit was issued on January 28, 2000 and subsequently, renewed and modified on June 27, 2005. The application (i.e., discharge plan) consists of the materials submitted by the permittee dated September 2, 2010 and materials contained in the administrative record prior to issuance of this Discharge Permit. The discharge shall be managed in accordance with all conditions and requirements of this Discharge Permit.

Pursuant to Section 20.6.2.3109 NMAC, NMED reserves the right to require a Discharge Permit Modification in the event NMED determines that the requirements of 20.6.2 NMAC are being or may be violated or the standards of Section 20.6.2.3103 NMAC are being or may be violated. This may include a determination that structural controls and/or management practices approved under this Discharge Permit are not protective of ground water quality, and that more stringent requirements to protect ground water quality may be required by NMED. The permittee may be required to implement abatement of water pollution and remediate ground water quality.

Issuance of this Discharge Permit does not relieve the permittee of the responsibility to comply with the WQA, WQCC Regulations, and any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

The following acronyms and abbreviations may be used in this Discharge Permit:

Abbreviation	Explanation		Abbreviation	Explanation
BOD_5	biochemical oxygen demand (5-day)		NTU	nephelometric turbidity units
CFR	Code of Federal Regulations		Org	organisms
Cl	Chloride		TDS	total dissolved solids
EPA	United States Environmental Protection Agency		TKN	total Kjeldahl nitrogen
gpd	gallons per day		total nitrogen	= TKN + NO_3-N
LADS	land application data sheet(s)		TRC	Total Residual Chlorine
mg/L	milligrams per liter		TSS	total suspended solids
mL	milliliters		UPC	Uniform Plumbing Code
NMAC	New Mexico Administrative Code		WQA	New Mexico Water Quality Act
NMED	New Mexico Environment Department		WQCC	Water Quality Control Commission
NMSA	New Mexico Statutes Annotated		WWTF	Wastewater Treatment Facility
NO_3-N	nitrate-nitrogen			

II. FINDINGS

In issuing this Discharge Permit, NMED finds:

1. The permittee is discharging effluent or leachate from the facility so that such effluent or leachate may move directly or indirectly into ground water within the meaning of Section 20.6.2.3104 NMAC.

2. The permittee is discharging effluent or leachate from the facility so that such effluent or leachate may move into ground water of the State of New Mexico which has an existing concentration of 10,000 mg/L or less of TDS within the meaning of Subsection A of 20.6.2.3101 NMAC.

3. The discharge from the facility is not subject to any of the exemptions of Section 20.6.2.3105 NMAC.

III. AUTHORIZATION TO DISCHARGE

Pursuant to 20.6.2.3104 NMAC, it is the responsibility of the permittee to ensure that discharges authorized by this Discharge Permit are consistent with the terms and conditions herein.

The permittee is authorized to receive and treat up to 6.5 MGD of domestic wastewater using an activated sludge WWTF. Treated and disinfected wastewater (reclaimed wastewater) is stored in two synthetically-lined impoundments with a total volume of about 4.5 million gallons at the city's golf course and used to irrigate approximately 563 acres of City owned property including:

Area	Acres
Spring-Carter Park	5
Heritage Park	3.6
Lake Carlsbad Recreation Area	1.5
Lake Carlsbad Area	34
Sports Complex	4
Bataan Rec Area	4.7
Dr. ML King Jr Memorial Park	8
Cruz Fernandez Park	3
Carlsbad Municipal Cemetery	73
Plaza de San Jose Park	7.3
Bataan Rec Area South	41.2
Bataan Rec Area East	5
Pecos River Recreation Area	24.5
Municipal Golf Course	127.2
Municipal par 3	24.5
Riverview Park	10.3
WWTF	186

Reclaimed wastewater may also be used for temporary uses that NMED has determined do not require a Discharge Permit, including dust control and construction uses by the city of Carlsbad and Eddy County.

Alternatively, treated wastewater is discharged directly to the Pecos River pursuant to NPDES Permit # NM0026395.

[20.6.2.3104 NMAC, Subsection C of 20.6.2.3106 NMAC, Subsection C of 20.6.2.3109 NMAC]

IV. CONDITIONS

NMED issues this Discharge Permit for the discharge of water contaminants subject to the following conditions:

A. OPERATIONAL PLAN

#	Terms and Conditions
1.	The permittee shall implement the following operational plan to ensure compliance with Title 20, Chapter 6, Parts 1 and 2 NMAC. [Subsection C of 20.6.2.3109 NMAC]
2.	The permittee shall operate in a manner such that standards and requirements of Sections 20.6.2.3101 and 20.6.2.3103 NMAC are not violated. [20.6.2.3101 NMAC, 20.6.2.3103 NMAC, Subsection C of 20.6.2.3109 NMAC]

Operational Actions with Implementation Deadlines

#	Terms and Conditions with Implementation Deadlines
3.	Within 90 days following the effective date of this Discharge Permit (**by DATE**), the permittee shall submit record drawings that bear the seal and signature of a licensed New Mexico professional engineer (pursuant to the New Mexico Engineering and Surveying Practice Act and the rules promulgated under that authority) for the recent wastewater treatment facility upgrades to NMED. [Subsections A and C of 20.6.2.1202 NMAC, Subsection C of 20.6.2.3109 NMAC, NMSA 1978, §§ 61-23-1 through 61-23-32]

Operating Conditions

#	Terms and Conditions
4.	Reclaimed wastewater discharged from UV-disinfection unit shall not exceed the following limitation: **Total Nitrogen: 10 mg/L**

<table>
<tr><th>#</th><th>Terms and Conditions</th></tr>
<tr><td></td><td>[Subsection C of 20.6.2.3109 NMAC]</td></tr>
<tr><td>5.</td><td>Reclaimed wastewater for irrigation discharged from the disinfection unit shall not exceed the following limitations:
<table>
<tr><th>Test</th><th>30-day geometric mean</th><th>30-day average</th><th>maximum</th></tr>
<tr><td>E. coli bacteria:</td><td>126 Org/100 mL</td><td>N/A</td><td>235 Org/100 mL</td></tr>
<tr><td>BOD_5:</td><td>N/A</td><td>30 mg/L</td><td>45 mg/L</td></tr>
<tr><td>TSS OR Turbidity:</td><td>N/A</td><td>30 mg/L</td><td>45 mg/L</td></tr>
<tr><td>UV Transmissivity and/or TRC</td><td>N/A</td><td>Monitor Only</td><td>Monitor Only</td></tr>
</table>
[Subsections B and C of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.D]</td></tr>
<tr><td>6.</td><td>The permittee shall apply reclaimed wastewater to cropland under cultivation and landscaping (the re-use areas) such that the amount of total nitrogen in the combined application of wastewater and fertilizer does not exceed by more than 25% the amount reasonably expected to be taken up by the crop(s) and removed by harvesting in any 12-month period. Nitrogen content shall not be adjusted to account for volatilization or mineralization processes. Reclaimed wastewater shall be distributed evenly throughout the re-use area. Excessive ponding shall be prevented.

[Subsection C of 20.6.2.3109 NMAC]</td></tr>
<tr><td>7.</td><td>The permittee shall meet the following specific requirements for temporary above ground uses of reclaimed domestic wastewater that do not require a Discharge Permit:
a) Access to the reclaimed wastewater distribution system (after disinfection) shall be restricted. Reclaimed wastewater shall only be transferred to the users by the permittee or its designate. Public access to the reclaimed wastewater system is prohibited.
b) All recipients of reclaimed wastewater for temporary uses shall be notified in writing of the following:
1) Reclaimed wastewater received from the permittee is approved for the following temporary uses only: construction purposes, soil compaction, mixing of mortars, slurries or cement, dust control on roads and construction sites, fire suppression, wildlife watering and irrigation of non-food crops by flood application only (spray irrigation is prohibited).
2) Transport vehicles and storage tanks containing reclaimed wastewater provided</td></tr>
</table>

#	Terms and Conditions
	by the permittee shall contain signs identifying the contents as non-potable water and advising against consumption in English and Spanish. Above ground use of reclaimed wastewater shall not result in excessive standing or pooling of wastewater. Application shall not be conducted at times when the receiving area is saturated or frozen. Spraying and misting of the reclaimed wastewater shall be minimized. [20.6.2.3109 NMAC]
8.	The permittee shall meet the following general requirements for above-ground use of reclaimed domestic wastewater: a) The permittee shall maintain signs in English and Spanish at all re-use areas such that they are visible and legible for the term of this Discharge Permit. The signs shall be posted at the entrance to re-use areas and at other locations where public exposure to reclaimed wastewater may occur. The signs shall state: **NOTICE: THIS AREA IS IRRIGATED WITH RECLAIMED WASTEWATER - DO NOT DRINK. AVISO: ESTA ÁREA ESTÁ REGADA CON AGUAS NEGRAS RECOBRADAS - NO TOMAR.** Alternate wording and/or graphics may be submitted to NMED for approval. b) The reclaimed wastewater systems shall have no direct or indirect cross connections with public water systems or irrigation wells pursuant to the latest revision of the New Mexico Plumbing Code (14.8.2 NMAC) and New Mexico Mechanical Code (14.9.2 NAMC). c) Above-ground use of reclaimed wastewater shall not result in excessive ponding of wastewater, and shall not exceed the water consumptive needs of the crop. Re-use shall not be conducted at times when the re-use area is saturated or frozen. d) The discharge of reclaimed wastewater shall be confined to the re-use area. e) The discharge of reclaimed domestic wastewater to crops for human consumption is prohibited. f) Water supply wells within 200 feet of a re-use area shall have adequate wellhead construction pursuant to 19.27.4 NMAC. Re-use shall be managed to ensure protection of ground water quality. g) Existing and accessible portions of the reclaimed wastewater distribution system (with the exception of application equipment such as sprinklers or pivots) shall be colored purple or clearly labeled as being part of a reclaimed wastewater distribution system. Piping, valves and outlets that are installed during the term of this Discharge Permit shall be colored purple pursuant to the latest revision of the New Mexico Plumbing Code (14.8.2 NMAC) and New Mexico Mechanical Code (14.9.2 NAMC) to differentiate piping or fixtures used to convey reclaimed wastewater from those intended for potable or other uses. Valves, outlets, and sprinkler heads used in reclaimed wastewater systems shall be accessible only to authorized personnel. [Subsections B and C of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.D]

#	**Terms and Conditions**
9.	The permittee shall meet the following setbacks, access restrictions and equipment requirements for spray irrigation using Class 1B reclaimed domestic wastewater: a) A minimum 100-foot setback shall be maintained between any dwellings or occupied establishments and the edge of the re-use area. b) Irrigation using reclaimed wastewater shall be postponed at times when windy conditions may result in drift of reclaimed wastewater outside the re-use area. c) Reclaimed wastewater shall be applied at times and in a manner that minimizes public contact. d) The spray irrigation system shall be limited to low trajectory spray nozzles. [Subsections B and C of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.D]
10.	In the event that a cross-connection with fresh water exists, the permittee shall institute a backflow prevention method to protect wells and public water supply systems from contamination by reclaimed wastewater prior to discharging to the re-use area. Backflow prevention shall be achieved by a total disconnect (physical air gap separation between the discharge pipe and the liquid surface at least twice the diameter of the discharge pipe), or by a reduced pressure principal backflow prevention assembly (RP) installed on the line between the fresh water supply wells or public water supply and the reclaimed wastewater delivery system. Backflow prevention shall be maintained at all times. RP devices shall be inspected and tested by a certified backflow prevention assembly tester at the time of installation, repair or relocation and at least on an annual basis thereafter. The backflow prevention assembly tester shall have successfully completed a 40-hour backflow prevention course based on the University of Southern California's Backflow Prevention Standards and Test Procedures, and obtained certification demonstrating completion. A malfunctioning RP device shall be repaired or replaced within 30 days of discovery, and use of all supply lines associated with the RP device shall cease until repair or replacement has been completed. Copies of the inspection and maintenance records and test results for each RP device associated with the backflow prevention program shall be maintained at a location available for inspection by NMED. [Subsection C of 20.6.2.3109 NMAC]
11.	The permittee shall maintain fences around the WWTF to control access by the general public and animals. The fences shall consist of a minimum of six-foot chain link or field fencing and locking gates. Fences shall be maintained throughout the term of this Discharge Permit. [Subsections B and C of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.D]
12.	The permittee shall maintain signs indicating that the wastewater at the facility is not potable. Signs shall be posted at the facility entrance and other areas where there is potential for public contact with wastewater. All signs shall be printed in English and

#	**Terms and Conditions**
	Spanish remain visible and legible for the term of this Discharge Permit. [Subsections B and C of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.D]
13.	The permittee shall maintain the impoundment liner(s) in such a manner as to avoid conditions which could affect the structural integrity of the impoundment(s) and/or impoundment liner(s). Such conditions include or may be characterized by the following: erosion damage; animal burrows or other damage; the presence of vegetation including aquatic plants, weeds, woody shrubs or trees growing within five feet of the top inside edge of a sub-grade impoundment, within five feet of the toe of the outside berm of an above-grade impoundment, or within the impoundment itself; the presence of large debris or large quantities of debris in the impoundment; evidence of seepage; and evidence of berm subsidence. Vegetation growing around the impoundment shall be routinely controlled by mechanical removal in a manner that is protective of the impoundment liner. The permittee shall visually inspect the impoundment(s) and surrounding berms on a monthly basis to ensure proper maintenance. In the event that inspection reveals any evidence of damage that threatens the structural integrity of an impoundment berm or liner, or that may result in an unauthorized discharge, the permittee shall enact the contingency plan set forth in this Discharge Permit. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
14.	The permittee shall properly manage all solids generated by the treatment system to maintain effective operation by removing solids as necessary in accordance with accepted process control methods. Solids removed from the treatment process shall be contained, transported, and disposed of in accordance with all local, state, and federal regulations. The permittee shall maintain records of solids disposal. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
15.	The permittee shall preserve a minimum of two feet of freeboard between the liquid level in the impoundment(s) and the elevation of the top of the impoundment liner. In the event that the permittee determines that two feet of freeboard cannot be preserved in the impoundment, the permittee shall enact the contingency plan set forth in this Discharge Permit. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
16.	The permittee shall utilize operators, certified by the State of New Mexico at the

#	Terms and Conditions
	appropriate level, to operate the wastewater collection, treatment and disposal systems. The operations and maintenance of all or any part of the wastewater system shall be performed by, or under the direct supervision of, a certified operator. [Subsection C of 20.6.2.3109 NMAC, 20.7.4 NMAC]

B. MONITORING AND REPORTING

#	Terms and Conditions
17.	The permittee shall conduct the following monitoring, reporting, and other requirements listed below in accordance with the monitoring requirements of this Discharge Permit. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
18.	METHODOLOGY – Unless otherwise approved in writing by NMED, the permittee shall conduct sampling and analysis in accordance with the most recent edition of the following documents: a) American Public Health Association, Standard Methods for the Examination of Water and Wastewater (18th, 19th or current) b) U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Waste c) U.S. Geological Survey, Techniques for Water Resources Investigations of the U.S. Geological Survey d) American Society for Testing and Materials, Annual Book of ASTM Standards, Part 31. Water e) U.S. Geological Survey, et al., National Handbook of Recommended Methods for Water Data Acquisition f) Federal Register, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations g) Methods of Soil Analysis: Part 1. Physical and Mineralogical Methods; Part 2. Microbiological and Biochemical Properties; Part 3. Chemical Methods, American Society of Agronomy [Subsection B of 20.6.2.3107 NMAC]
19.	The permittee shall submit quarterly monitoring reports to NMED for the most recently completed quarterly period by the 1st of February, May, August and November each year. Quarterly monitoring shall be performed during the following periods and submitted as follows: • January 1st through March 31st (first quarter) – **due by May 1st** • April 1st through June 30th (second quarter) – **due by August 1st** • July 1st through September 30th (third quarter) – **due by November 1st**

#	Terms and Conditions
	• October 1st through December 31st (fourth quarter) – **due by February 1st** [Subsection A of 20.6.2.3107 NMAC]

Monitoring Actions with Implementation Deadlines

#	Terms and Conditions with Implementation Deadlines
20.	Prior to discharging from the facility to the reuse areas including the grounds of the treatment facility, the permittee shall install: • Totalizing flow meters on the discharge line from the treatment system to measure the flow to each of the re-use areas. Confirmation of meter installation, type, calibration and locations shall be submitted to NMED prior to discharging to reuse areas from the facility. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]

Facility Monitoring Conditions

#	Terms and Conditions
21.	The permittee shall measure the totalized, volume of wastewater entering the treatment facility each month using a totalizing flow meter located at the headworks. The totalized volumes for each month shall be submitted to NMED in the quarterly monitoring reports. [Subsection A of 20.6.2.3107 NMAC, Subsections C and H of 20.6.2.3109 NMAC]
22.	The permittee shall measure the monthly volume of reclaimed wastewater discharged from the disinfection treatment unit for any temporary above ground use by the City of Carlsbad and/or Eddy County and to the re-use areas:

Area	Acres
Spring-Carter Park	5
Heritage Park	3.6
Lake Carlsbad Recreation Area	1.5
Lake Carlsbad Area	34
Sports Complex	4
Bataan Rec Area	4.7

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Dr. ML King Jr Memorial Park	8
Cruz Fernandez Park	3
Carlsbad Municipal Cemetery	73
Plaza de San Jose Park	7.3
Bataan Rec Area South	41.2
Bataan Rec Area East	5
Pecos River Recreation Area	24.5
Municipal Golf Course	127.2
Municipal par 3	24.5
Riverview Park	10.3
WWTF	186

The permittee shall obtain readings from a totalizing flow meter located at the outlet of the disinfection unit on a monthly basis and calculate the monthly and average daily discharge volume to the reuse areas.

The monthly meter readings, and calculated monthly discharge volumes shall be submitted to NMED in the quarterly monitoring reports.

[Subsection A of 20.6.2.3107 NMAC, Subsections C and H of 20.6.2.3109 NMAC]

23. All flow meters shall be capable of having their accuracy ascertained under actual working (field) conditions. A field calibration method shall be developed for each flow meter and that method shall be used to check the accuracy of each respective meter. Field calibrations shall be performed upon repair or replacement of a flow measurement device and, at a minimum, on an annual basis.

Flow meters shall be calibrated to within plus or minus 10 percent of actual flow, as measured under field conditions. Field calibrations shall be performed by an individual knowledgeable in flow measurement and in the installation/operation of the particular device in use. A flow meter calibration report shall be prepared for each flow measurement device at the frequency calibration is required. The flow meter calibration report shall include the following information:

a) The location and meter identification.
b) The method of flow meter field calibration employed.
c) The measured accuracy of each flow meter prior to adjustment indicating the positive or negative offset as a percentage of actual flow as determined by an in-field

#	**Terms and Conditions**
	calibration check. d) The measured accuracy of each flow meter following adjustment, if necessary, indicating the positive or negative offset as a percentage of actual flow of the meter. e) Any flow meter repairs made during the previous year or during field calibration. The permittee shall maintain records of flow meter calibration(s) at a location accessible for review by NMED during facility inspections. [Subsection A of 20.6.2.3107 NMAC, Subsections C and H of 20.6.2.3109 NMAC]
24.	The permittee shall visually inspect flow meters on a monthly basis for evidence of malfunction. If a visual inspection indicates a flow meter is not functioning as required by this Discharge Permit, the permittee shall repair or replace the meter within 30 days of discovery. For *repaired* meters, the permittee shall submit a report to NMED with the next monitoring report following the repair that includes a description of the malfunction; a statement verifying the repair; and a flow meter field calibration report completed in accordance with the requirements of this Discharge Permit. For *replacement* meters, the permittee shall submit a report to NMED with the next monitoring report following the replacement that includes a design schematic for the device and a flow meter field calibration report completed in accordance with the requirements of this Discharge Permit. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
25.	The permittee shall collect samples of reclaimed wastewater from the effluent transferred for irrigation on a quarterly basis and analyze the samples for TKN, NO_3-N, TDS and Cl. Samples shall be properly prepared, preserved, transported and analyzed in accordance with the methods authorized in this Discharge Permit. Analytical results shall be submitted to NMED in the quarterly monitoring reports. [Subsection A of 20.6.2.3107 NMAC, Subsections C and H of 20.6.2.3109 NMAC]
26.	During any week that the discharge of reclaimed wastewater occurs, the permittee shall perform the following analyses on reclaimed wastewater samples collected from the outlet of the disinfection unit using the following sampling method and frequency: • E. coli bacteria: grab sample at peak daily flow five times per week. • BOD5: 24-hour composite sample once per week. • TSS: 24-hour composite sample once per week. • UV transmissivity values and/or TRC concentrations as appropriate: record whenever E. coli samples are collected. Samples shall be properly prepared, preserved, transported and analyzed in accordance with the methods authorized in this Discharge Permit. Analytical results and a copy of the log of UV transmissivity values and/or TRC concentrations shall he submitted to

#	Terms and Conditions
	NMED in the quarterly monitoring reports. [Subsection A of 20.6.2.3107 NMAC, Subsections B, C and H of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.D]
27.	The permittee shall submit copies of data analyzed and submitted to EPA in accordance with Tables A.12, B.6, and Part D of EPA Form 2A, or its equivalent if modified in the future, during the second, third and fourth years after the permit effective date of NPDES permit NM 0026395. [Subsection A of 20.6.2.3107 NMAC, Subsections C and H of 20.6.2.3109 NMAC]
28.	The permittee shall complete LADS (copy enclosed) on a monthly basis that document the amount of nitrogen applied to *each* location, field, zone, etc. during the most recent 12 months. The LADS shall reflect the total nitrogen concentration from the most recent wastewater analysis and the measured discharge volumes to *each* location, field, zone, etc for each month. The LADS shall be completed with the information above or shall include a statement that the discharge of treated wastewater did not occur. The LADS shall be submitted to NMED in the quarterly monitoring reports. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
29.	The permittee shall keep a log (copy enclosed) of all additional nitrogenous fertilizer applied to *each* location or field, etc. within the re-use area. The log shall contain the date of fertilizer application, the type (organic or inorganic) and form (granular or liquid), nitrogen concentration (in percent), the amount of fertilizer applied (in pounds per acre), and the amount of nitrogen applied (in pounds per acre) for each location. The log, or a statement that application of fertilizer did not occur, shall be submitted to NMED in the quarterly monitoring reports. [Subsection A of 20.6.2.3107 NMAC]
30.	Records of solids disposal, including a copy of all Discharge Monitoring Reports (i.e., DMRs) required to be submitted to the EPA pursuant to 40 CFR 503 for the previous calendar year, shall be submitted to NMED annually in the monitoring report due by August 1st each year. [Subsection A of 20.6.2.3107 NMAC]

C. CONTINGENCY PLAN

#	Terms and Conditions
31.	In the event that a ground water quality standard identified in Section 20.6.2.3103 NMAC is exceeded; the total nitrogen concentration in ground water is greater than 10 mg/L; or a

#	**Terms and Conditions**
	toxic pollutant (defined in Subsection WW of 20.6.2.7 NMAC) is present in ground water during the term of this Discharge Permit, upon closure of the facility or during the implementation of post-closure requirements, the permittee shall propose measures to mitigate damage from the discharge including, at a minimum, source control measures and a completion schedule by submitting a corrective action plan to NMED for approval. The permittee may be required to abate water pollution pursuant to Sections 20.6.2.4000 through 20.6.2.4115 NMAC, should the corrective action plan not result in compliance with the standards and requirements set forth in Section 20.6.2.4103 NMAC within 180 days of confirmation of ground water contamination. [Subsection A of 20.6.2.3107 NMAC, Subsection E of 20.6.2.3109 NMAC]
32.	In the event that analytical results of a quarterly treated wastewater sample indicate an exceedance of the total nitrogen limitation set in this Discharge Permit, the permittee shall collect and analyze a second sample within 30 days of the first sample analysis date. In the event the second sample results indicate that the limitation is continuing to be exceeded, the following contingency plan shall be enacted: a) Within 15 days of the second sample analysis date indicating that the limitation is continuing to be exceeded, the permittee shall i) notify NMED that the contingency plan is being enacted; and ii) submit a copy of the first and second analytical results indicating an exceedance to NMED. b) The permittee shall increase the frequency of total nitrogen wastewater sampling and analysis of treated wastewater to once per month. c) The permittee shall examine the operation and maintenance log, required by the Record Keeping conditions of this Discharge Permit, for improper operational procedures. d) The permittee shall conduct a physical inspection of the treatment system to detect abnormalities. Any abnormalities discovered shall be corrected. A report detailing the corrections made shall be submitted to NMED within 30 days of correction. e) In the event that any analytical results from monthly wastewater sampling indicate an exceedance of the total nitrogen limitation, the permittee shall propose to modify operational procedures and/or upgrade the treatment process to achieve the total nitrogen limit by submitting a corrective action plan to NMED for approval. The plan shall include a schedule for completion of corrective actions and shall be submitted within 90 days of the second sample analysis date indicating that the limitation is continuing to be exceeded. The permittee shall initiate implementation of the plan following approval by NMED. When analytical results from three consecutive months of wastewater sampling do not exceed the limitation, the permittee is authorized to return to a quarterly monitoring frequency. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]

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33.	In the event that analytical results of a reclaimed domestic wastewater sample indicates an exceedance of any of the maximum limitations for BOD_5, TSS/turbidity, or E. coli bacteria set by this Discharge Permit, the permittee shall collect and analyze a second sample within 24 hours after becoming aware of the exceedance. In the event the second sample results indicate that any maximum limitation is continuing to be exceeded (i.e., confirmed exceedance), the contingency plan below shall be enacted. **AND / OR** In the event that analytical results of a reclaimed domestic wastewater sample indicates an exceedance of any of the 30-day average limitations for BOD_5, TSS/turbidity, or E. coli bacteria set by this Discharge Permit (i.e., confirmed exceedance), the contingency plan below shall be enacted. <u>Contingency Plan</u> a) Within 24 hours of becoming aware of a confirmed exceedance (as identified above), the permittee shall: i) notify NMED that the contingency plan is being enacted; and ii) submit copies of the recent analytical results indicating an exceedance to NMED. b) The permittee shall immediately cease discharging reclaimed domestic wastewater to the storage impoundments and/or transferring reclaimed wastewater to re-use areas or using it for temporary uses other than for wash/process water which is allowed. c) The permittee shall examine the operation and maintenance log, required by the Record Keeping conditions of this Discharge Permit, for improper operational procedures. d) The permittee shall conduct a physical inspection of the treatment system to detect abnormalities. Any abnormalities discovered shall be corrected. A report detailing the corrections made shall be submitted to NMED within 30 days following correction. When the analytical results from samples of reclaimed domestic wastewater, sampled as required by this Discharge Permit, no longer indicate an exceedance of any of the maximum limitations, the permittee may resume discharging reclaimed wastewater to the re-use areas and using it for the proscribed temporary uses noted in b) above. If a facility is required to enact the contingency plan more than two times in a 12-month period, the permittee shall propose to modify operational procedures and/or upgrade the treatment process to achieve consistent compliance with the maximum and 30-day average limitations by submitting a corrective action plan for NMED approval. The plan shall include a schedule for completion of corrective actions and shall be submitted within 60 days following the second sample analysis date. The permittee shall initiate implementation of the plan following approval by NMED. Prior to recommencing discharge to the re-use area, additional sampling of any stored reclaimed wastewater may

#	**Terms and Conditions**
	be required by NMED in response to the submitted corrective action plan. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
34.	In the event that inspection findings reveal significant damage likely to affect the structural integrity of the lined impoundment(s) or its ability to contain contaminants, the permittee shall propose the repair or replacement of the impoundment liner(s) by submitting a corrective action plan to NMED for approval. The plan shall be submitted to NMED within 30 days after discovery by the permittee or following notification from NMED that significant liner damage is evident. The corrective action plan shall include a schedule for completion of corrective actions and the permittee shall initiate implementation of the plan following approval by NMED. [Subsection A of 20.6.2.3107 NMAC, Subsection C of 20.6.2.3109 NMAC]
35.	In the event that a minimum of two feet of freeboard cannot be preserved in the impoundment(s), the permittee shall take actions authorized by this Discharge Permit and all applicable local, state, and federal regulations to restore the required freeboard. In the event that two feet of freeboard cannot be restored within a period of 72 hours following discovery, the permittee shall propose actions to be immediately implemented to restore two feet of freeboard by submitting a short-term corrective action plan to NMED for approval. Examples of short-term corrective actions include: removing excess wastewater from the impoundment through pumping and hauling; or reducing the volume of wastewater discharged to the impoundment. The plan shall include a schedule for completion of corrective actions and shall be submitted within 15 days following the date when the two feet of freeboard limit was initially discovered. The permittee shall initiate implementation of the plan following approval by NMED. In the event that the short-term corrective actions failed to restore two feet of freeboard, the permittee shall propose permanent corrective actions in a long-term corrective action plan submitted to NMED within 90 days following failure of the short-term corrective action plan. Examples include: the installation of an additional storage impoundment, or a significant/permanent reduction in the volume of wastewater discharged to the impoundment. The plan shall include a schedule for completion of corrective actions and implementation of the plan shall be initiated following approval by NMED. [Subsection A of 20.6.2.3107 NMAC]
36.	In the event that a release (commonly known as a "spill") occurs that is not authorized under this Discharge Permit, the permittee shall take measures to mitigate damage from the unauthorized discharge and initiate the notifications and corrective actions required in Section 20.6.2.1203 NMAC and summarized below.

#	Terms and Conditions
	Within 24 hours following discovery of the unauthorized discharge, the permittee shall verbally notify NMED and provide the following information: a) The name, address, and telephone number of the person or persons in charge of the facility, as well as of the owner and/or operator of the facility. b) The name and address of the facility. c) The date, time, location, and duration of the unauthorized discharge. d) The source and cause of unauthorized discharge. e) A description of the unauthorized discharge, including its estimated chemical composition. f) The estimated volume of the unauthorized discharge. g) Any actions taken to mitigate immediate damage from the unauthorized discharge. Within one week following discovery of the unauthorized discharge, the permittee shall submit written notification to NMED with the information listed above and any pertinent updates. Within 15 days following discovery of the unauthorized discharge, the permittee shall submit a corrective action report/plan to NMED describing any corrective actions taken and/or to be taken relative to the unauthorized discharge that includes the following: a) A description of proposed actions to mitigate damage from the unauthorized discharge. b) A description of proposed actions to prevent future unauthorized discharges of this nature. c) A schedule for completion of proposed actions. In the event that the unauthorized discharge causes or may with reasonable probability cause water pollution in excess of the standards and requirements of Section 20.6.2.4103 NMAC, and the water pollution will not be abated within 180 days after notice is required to be given pursuant to Paragraph (1) of Subsection A of 20.6.2.1203 NMAC, the permittee may be required to abate water pollution pursuant to Sections 20.6.2.4000 through 20.6.2.4115 NMAC. Nothing in this condition shall be construed as relieving the permittee of the obligation to comply with all requirements of Section 20.6.2.1203 NMAC. [20.6.2.1203 NMAC]
37.	In the event that NMED or the permittee identifies any failures of the discharge plan or this Discharge Permit not specifically noted herein, NMED may require the permittee to submit a corrective action plan and a schedule for completion of corrective actions to address the failure(s). Additionally, NMED may require a Discharge Permit modification to achieve compliance with 20.6.2 NMAC. [Subsection A of 20.6.2.3107 NMAC, Subsection E of 20.6.2.3109 NMAC]

Permanent Facility Closure Conditions

#	Terms and Conditions
38.	In the event the facility, or a component of the facility, is proposed to be permanently closed, upon ceasing discharge, the permittee shall perform the following closure measures: Within 90 days of ceasing discharge to the treatment or reuse system, the permittee shall complete the following closure measures: a) The line leading to the system shall be plugged so that a discharge can no longer occur. b) Wastewater shall be drained or evaporated from the system components and storage impoundment(s), and it shall be disposed of in accordance with all local, state, and federal regulations or discharged from the system to the re-use area, as authorized by this Discharge Permit. The discharge of accumulated solids (sludge) to the re-use area is prohibited. c) Solids removed from the treatment system shall be contained, transported, and disposed of in accordance with all local, state, and federal regulations, including 40 CFR Part 503.The permittee shall maintain a record of all solids transported for off-site disposal. Within 180 days of ceasing discharging to the treatment system (or unit), the permittee shall complete the following closure measures: a) Remove all lines leading to and from the treatment system, or permanently plug them and abandon them in place. b) Remove or demolish all treatment system components, and re-grade area with suitable fill to blend with surface topography, promote positive drainage and prevent ponding. c) Perforate or remove the storage impoundment liner(s); fill the impoundment(s) with suitable fill; and re-grade the impoundment site(s) to blend with surface topography, promote positive drainage and prevent ponding. When all closure and post-closure requirements have been met, the permittee may submit a written request for termination of the Discharge Permit to NMED. [Subsection A of 20.6.2.3107 NMAC, 40 CFR Part 503]

E. GENERAL TERMS AND CONDITIONS

#	Terms and Conditions
39.	RECORD KEEPING - The permittee shall maintain a written record of the following information: a) Information and data used to complete the application for this Discharge Permit. b) Records of any releases (commonly known as "spills") not authorized under this

#	Terms and Conditions
	Discharge Permit and reports submitted pursuant to 20.6.2.1203 NMAC. c) Records of the operation, maintenance, and repair of all facilities/equipment used to treat, store or dispose of wastewater. d) Facility record drawings (plans and specifications) showing the actual construction of the facility and bear the seal and signature of a licensed New Mexico professional engineer. c) Copies of monitoring reports completed and/or submitted to NMED pursuant to this Discharge Permit. f) The volume of wastewater or other wastes discharged pursuant to this Discharge Permit. g) Ground water quality and wastewater quality data collected pursuant to this Discharge Permit. h) Copies of construction records (well log) for all ground water monitoring wells required to be sampled pursuant to this Discharge Permit. i) Records of the maintenance, repair, replacement or calibration of any monitoring equipment or flow measurement devices required by this Discharge Permit. j) Data and information related to field measurements, sampling, and analysis conducted pursuant to this Discharge Permit. The following information shall he recorded and shall be made available to NMED upon request: i) The dates, location and times of sampling or field measurements; ii) The name and job title of the individuals who performed each sample collection or field measurement; iii) The sample analysis date of each sample; iv) The name and address of the laboratory, and the name of the signatory authority for the laboratory analysis; v) The analytical technique or method used to analyze each sample or collect each field measurement; vi) The results of each analysis or field measurement, including raw data; vii) The results of any split, spiked, duplicate or repeat sample; and viii) A copy of the laboratory analysis chain-of-custody as well as a description of the quality assurance and quality control procedures used. The written record shall be maintained by the permittee at a location accessible during a facility inspection by NMED for a period of at least five years from the date of application, report, collection or measurement and shall be made available to the department upon request. [Subsections A and D of 20.6.2.3107 NMAC]
40.	INSPECTION and ENTRY – The permittee shall allow inspection by NMED of the facility and its operations which are subject to this Discharge Permit and the WQCC regulations. NMED may upon presentation of proper credentials, enter at reasonable times upon or through any premises in which a water contaminant source is located or in which are located any records required to be maintained by regulations of the federal

#	**Terms and Conditions**
	government or the WQCC. The permittee shall allow NMED to have access to and reproduce for their use any copy of the records, and to perform assessments, sampling or monitoring during an inspection for the purpose of evaluating compliance with this Discharge Permit and the WQCC regulations. Nothing in this Discharge Permit shall be construed as limiting in any way the inspection and entry authority of NMED under the WQA, the WQCC Regulations, or any other local, state or federal regulations. [Subsection D of 20.6.2.3107 NMAC, NMSA 1978, §§ 74-6-9.B and 74-6-9.E]
41.	DUTY to PROVIDE INFORMATION - The permittee shall, upon NMED's request, allow for NMED's inspection/duplication of records required by this Discharge Permit and/or furnish to NMED copies of such records. [Subsection D of 20.6.2.3107 NMAC]
42.	MODIFICATIONS and/or AMENDMENTS – In the event the permittee proposes a change to the facility or the facility's discharge that would result in a change in the volume discharged; the location of the discharge; or in the amount or character of water contaminants received, treated or discharged by the facility, the permittee shall notify NMED prior to implementing such changes. The permittee shall obtain approval (which may require modification of this Discharge Permit) by NMED prior to implementing such changes. [Subsection C of 20.6.2.3107 NMAC, Subsections E and G of 20.6.2.3109 NMAC]
43.	PLANS and SPECIFICATIONS – In the event the permittee is proposing to construct a wastewater system or change a process unit of an existing system such that the quantity or quality of the discharge will change substantially from that authorized by this Discharge Permit, the permittee shall submit construction plans and specifications to NMED for the proposed system or process unit prior to the commencement of construction. In the event the permittee implements changes to the wastewater system authorized by this Discharge Permit which result in only a minor effect on the character of the discharge, the permittee shall report such changes (including the submission of record drawings, where applicable) as of January 1 and June 30 of each year to NMED. [Subsections A and C of 20.6.2.1202 NMAC, NMSA 1978, §§ 61-23-1 through 61-23-32]
44.	CIVIL PENALTIES - Any violation of the requirements and conditions of this

#	Terms and Conditions
	Discharge Permit, including any failure to allow NMED staff to enter and inspect records or facilities, or any refusal or failure to provide NMED with records or information, may subject the permittee to a civil enforcement action. Pursuant to WQA 74-6-10(A) and (B), such action may include a compliance order requiring compliance immediately or in a specified time, assessing a civil penalty, modifying or terminating the Discharge Permit, or any combination of the foregoing; or an action in district court seeking injunctive relief, civil penalties, or both. Pursuant to WQA 74-6-10(C) and 74-6-10.1, civil penalties of up to $15,000 per day of noncompliance may be assessed for each violation of the WQA 74-6-5, the WQCC Regulations, or this Discharge Permit, and civil penalties of up to $10,000 per day of noncompliance may be assessed for each violation of any other provision of the WQA, or any regulation, standard, or order adopted pursuant to such other provision. In any action to enforce this Discharge Permit, the permittee waives any objection to the admissibility as evidence of any data generated pursuant to this Discharge Permit. [20.6.2.1220 NMAC, NMSA 1978, §§ 74-6-10 and 74-6-10.1]
45.	CRIMINAL PENALTIES – No person shall: 1) make any false material statement, representation, certification or omission of material fact in an application, record, report, plan or other document filed, submitted or required to be maintained under the WQA; 2) falsify, tamper with or render inaccurate any monitoring device, method or record required to be maintained under the WQA; or 3) fail to monitor, sample or report as required by a permit issued pursuant to a state or federal law or regulation. Any person who knowingly violates or knowingly causes or allows another person to violate the requirements of this condition is guilty of a fourth degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who is convicted of a second or subsequent violation of the requirements of this condition is guilty of a third degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who knowingly violates the requirements of this condition or knowingly causes another person to violate the requirements of this condition and thereby causes a substantial adverse environmental impact is guilty of a third degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who knowingly violates the requirements of this condition and knows at the time of the violation that he is creating a substantial danger of death or serious bodily injury to any other person is guilty of a second degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. [20.6.2.1220 NMAC, NMSA 1978, §§ 74-6-10.2.A through 74-6-10.2.F]
46.	COMPLIANCE with OTHER LAWS - Nothing in this Discharge Permit shall be

#	**Terms and Conditions**
	construed in any way as relieving the permittee of the obligation to comply with all applicable federal, state, and local laws, regulations, permits or orders. [NMSA 1978, § 74-6-5.L]
47.	RIGHT to APPEAL - The permittee may file a petition for review before the WQCC on this Discharge Permit. Such petition shall be in writing to the WQCC within thirty days of the receipt of postal notice of this Discharge Permit and shall include a statement of the issues to be raised and the relief sought. Unless a timely petition for review is made, the decision of NMED shall be final and not subject to judicial review. [20.6.2.3112 NMAC, NMSA 1978, § 74-6-5.O]
48.	TRANSFER of DISCHARGE PERMIT - Prior to the transfer of any ownership, control, or possession of this facility or any portion thereof, the permittee shall: 1) notify the proposed transferee in writing of the existence of this Discharge Permit; 2) include a copy of this Discharge Permit with the notice; and 3) deliver or send by certified mail to NMED a copy of the notification and proof that such notification has been received by the proposed transferee. Until both ownership and possession of the facility have been transferred to the transferee, the permittee shall continue to be responsible for any discharge from the facility. [20.6.2.3111 NMAC]
49.	PERMIT FEES - Payment of permit fees is due at the time of Discharge Permit approval. Permit fees shall be paid in a single payment or shall be paid in equal installments on a yearly basis over the term of the Discharge Permit. Single payments shall be remitted to NMED no later than 30 days after the Discharge Permit effective date. Initial installment payments shall be remitted to NMED no later than 30 days after the Discharge Permit effective date; subsequent installment payments shall be remitted to NMED no later than the anniversary of the Discharge Permit effective date. Permit fees are associated with <u>issuance</u> of this Discharge Permit. Nothing in this Discharge Permit shall be construed as relieving the permittee of the obligation to pay all permit fees assessed by NMED. A permittee that ceases discharging or does not commence discharging from the facility during the term of the Discharge Permit shall pay all permit fees assessed by NMED. An approved Discharge Permit shall be suspended or terminated if the facility fails to remit an installment payment by its due date. [Subsection F of 20.6.2.3114 NMAC, NMSA 1978, § 74-6-5.K]

V. PERMIT TERM & SIGNATURE

EFFECTIVE DATE: [effective date]
TERM ENDS: [expiration date]
[Subsection H of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.I]

JERRY SCHOEPPNER
Chief, Ground Water Quality Bureau
New Mexico Environment Department

New Mexico Environment Department Ground Water Quality Bureau
Discharge Permit Summary

Facility Information

Facility Name Carlsbad Wastewater Treatment Facility
Discharge Permit Number DP-1274

Legally Responsible Party

Harry Burgess, City Administrator
Carlsbad Wastewater Treatment Facility
P.O. Box 1569
Carlsbad, NM 88221-1569
(575) 887-1191

Treatment, Disposal and Site Information

Primary Waste Type Domestic
Facility Type Municipal Activated Sludge

Treatment Methods

Type	Designation	Description & Comments
Wastewater Treatment System	Wastewater Treatment Facility	Activated sludge using fine bubble aeration followed by UV disinfection. Irrigation with reclaimed effluent. Sludge digestion and composting of solids.

Discharge Locations

TYPE	LOCATION	AREA (Acres)
Reuse Area	Spring-Carter Park	5
Reuse Area	Heritage Park	3.6
Reuse Area	Lake Carlsbad Recreation Area East	1.5
Reuse Area	Lake Carlsbad Recreation Area	34
Reuse Area	Sports Complex	4
Reuse Area	Bataan Rec Area	4.7
Reuse Area	Dr. ML King Jr Memorial Park	8
Reuse Area	Cruz Fernandez Park	3
Reuse Area	Carlsbad Municipal Cemetery	73
Reuse Area	Plaza de San Jose Park	7.3
Reuse Area	Bataan Rec Area South	41.2
Reuse Area	Bataan Rec Area East	5
Reuse Area	Pecos River Rec	24.5
Reuse Area	Municipal Golf Course	127.2
Reuse Area	Municipal par 3	24.5
Reuse Area	Riverview Park	10.3
Reuse Area	WWTF	186

Flow Metering Locations

Type	Designation	Description & Comments
Totalizing Flow Meter	Influent	Sonar type in conjunction with Parshall flume at headworks.
Totalizing Flow Meters	Effluent: Discharge to Pecos River	Totalizing magnetic flow meter.

Totalizing Flow Meters	**Effluent: Discharge to reuse area**	Totalizing magnetic flow meter.
Totalizing Flow Meters	Effluent for uses not requiring a discharge permit including dust control at the WWTF	6" water meter should

Depth-to-Ground Water 8 to 85 feet
Total Dissolved Solids (TDS) 952 mg/L

Permit Information

Application Received September 2, 2010
Public Notice Published [not yet published]
Discharge Permit Issued [effective date]
Discharge Permit Term Ends [term end date]
Permitted Discharge Volume 6.5 MGD

NMED Contact Information

Mailing Address Ground Water Quality Bureau
P.O. Box 5469
Santa Fe, New Mexico 87502-5469

GWQB Telephone Number (505) 827-2900

NMED Lead Staff Russell A. Isaac
Lead Staff Telephone Number (505827-2978
Lead Staff Email russell.isaac@state.nm.us

NEW MEXICO ENVIRONMENT DEPARTMENT
GROUND WATER POLLUTION PREVENTION SECTION
SYNTHETICALLY LINED LAGOONS - LINER MATERIAL AND SITE PREPARATION GUIDELINES

Purpose: These guidelines represent minimum liner material and site preparation requirements for wastewater treatment, storage and evaporation lagoons. These requirements do not apply to lagoons storing hazardous wastes or high strength waste. The Ground Water Quality Bureau may impose additional requirements (e.g., double-lined lagoons with leak detection) for facilities discharging hazardous or high strength waste to lagoons through the development of specific Discharge Permit conditions for such facilities.

Liner Material Requirements:

1. The liner shall be chemically compatible with any material that will contact the liner.
2. The liner material shall be resistant to deterioration by sunlight if any portion of the liner will be exposed.
3. Synthetic liner material shall be of sufficient thickness to have adequate tensile strength and tear and puncture resistance. Under no circumstances shall a synthetic liner material less than 40 mils in thickness be accepted. Any liner material shall be certified by a licensed New Mexico professional engineer and approved by the New Mexico Environment Department (NMED) prior to its installation.

Lagoon Design and Site Preparation Requirements:

1. The system shall be certified by a licensed New Mexico professional engineer and approved by NMED prior to installation.
2. Inside slopes shall be a maximum of 3 (horizontal): 1 (vertical), and a minimum of 4 (horizontal); 1 (vertical).
3. Lagoon volume shall be designed to allow for a minimum of 24 inches of freeboard.
4. The liner shall be installed with sufficient liner material to accommodate shrinkage due to temperature changes. Folds in the liner are not acceptable.
5. To a depth of at least six inches below the liner, the sub-grade shall be free of sharp rocks, vegetation and stubble. In addition, liners shall be placed on a sub-grade of sand or fine soil. The surface in contact with the liner shall be smooth to allow for good contact between liner and sub-grade. The surface shall be dry during liner installation.
6. Sub-grade shall be compacted to a minimum of 90% of standard proctor density.
7. The minimum dike width shall be eight feet to allow vehicle traffic for maintenance.
8. The base of the pond shall be as uniform as possible and shall not vary more than three inches from the average finished elevation.
9. Synthetic liners shall be anchored in an anchor trench in the top of the berm. The trench shall be a minimum of 12 inches wide, 12 inches deep and shall be set back at least 24 inches from the inside edge of the berm.
10. If the lagoon is installed over areas of decomposing organic materials or shallow ground water, a liner vent system shall be installed.
11. Any opening in the liner through which a pipe or other fixture protrudes shall be properly sealed. Liner penetrations shall be detailed in the construction plans and record drawings.
12. A synthetic liner shall not be installed in temperatures below freezing.
13. The liner shall be installed or supervised by an individual that has the necessary training and experience as required by the liner manufacturer.
14. All manufacturer's installation and field seaming guidelines shall be followed.
15. All synthetic liner seams shall be field tested by the installer and verification of the adequacy of the seams shall be submitted to NMED along with the record drawings.

16. Concrete slabs installed on top of the synthetic liner for operational purposes shall be completed in accordance with manufacturer and installer recommendations to ensure liner integrity.
17. NMED shall be notified in advance when construction of the lagoon is to begin. NMED shall be notified upon completion of the liner installation and prior to any discharge to the lagoon to allow NMED the opportunity to inspect the liner installation.
18. Record drawings, final specifications and final lagoon capacity calculations shall be submitted to NMED within 30 days of completion of construction. These plans shall be certified by a licensed New Mexico professional engineer.

New Mexico Environment Department

Ground Water Quality Bureau

Land Application Data Sheet - Effluent

Last Updated: June 14, 2003

DP#: _____ FACILITY NAME: _____

FIELD: _____ ACRES: _____ REPORT PERIOD - FROM: _____ TO: _____

CROP 1: _____ YIELD: _____

CROP 2: _____ YIELD: _____ TOTAL NITROGEN UPTAKE OF CROP(S): _____ lbs/ac

CROP 3: _____ YIELD: _____

Effluent

DATE/MONTH OF APPLICATION	CROP IN AT TIME OF APPLICATION	A VOLUME OF EFFLUENT APPLIED[1] gal	B LAB RESULTS[2] (TKN + NO3-N) mg/l	C NITROGEN CONCENTRATION (B x 8.3452 x 10^{-6}) lbs/gal	D TOTAL NITROGEN (A x C) lbs N	E NITROGEN (D/acres) lbs N/acre	APPLICATION METHOD Flood, Sprinkler, etc.
January							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November							
December							

Total Nitrogen Applied from Effluent (lbs/ac)

Fertilizer Log

New Mexico Environment Department
Ground Water Quality Bureau

DATE: _____ MONITORING REPORT DUE DATE: _____

FACILITY NAME: _____ REPORTING PERIOD (i.e., from ____ to ____): _____

DP#: _____ FIELD #:[1] _____ # ACRES IN FIELD: _____

DAY, MONTH & YEAR OF APPLICATION[2]	A TYPE organic = O inorganic = I	B FORM granular = G liquid = L	C NITROGEN CONCENTRATION %	D FERTILIZER: TOTAL AMOUNT APPLIED lbs/acre	E NITROGEN: TOTAL AMOUNT APPLIED lbs/acre	NOTES[3]
DD - MM - YY	*I*	*G*	*10*	*200*	20	
			TOTALS			

[1]One Fertilizer Log form should be used for *each* field.
[2]Each form must reflect the *most recent* 12 months of fertilizer application.
[3]In the event application did not occur, please report "no application" in the NOTES column.

Last Updated: September 22, 2011

Appendix B

NMED Ground Water Quality Bureau Guidance

NMED GROUND WATER QUALITY BUREAU GUIDANCE:

ABOVE GROUND USE OF RECLAIMED DOMESTIC WASTEWATER

January 2007

PURPOSE

This document provides guidance for the above ground use of reclaimed domestic wastewater necessary to ensure protection of public health and the environment. The New Mexico Environment Department (NMED) has developed this guidance document to promote the safe use of reclaimed wastewater to offset the use of limited potable water resources in the State. This guidance document is intended to provide direction for any person seeking to submit an application for a Ground Water Discharge Permit that includes the above ground use of reclaimed wastewater. This document is used by NMED technical staff to ensure consistency in the application review process and in the development of permit requirements. This guidance document will also be made available to the regulated community and their consultants to provide a basis for future facility planning.

Ground Water Discharge Permit applications for above ground use of reclaimed domestic wastewater that follow this guidance document will be approved. However, applicants may make alternative demonstrations to NMED that the existing or proposed discharge of reclaimed domestic wastewater at a specific facility is protective of public health and the environment. NMED encourages the development and implementation of new processes and equipment, and will favorably consider them on a case by case basis.

The generator of the reclaimed wastewater is responsible for discharges of reclaimed wastewater unless this responsibility is assumed by a separate entity pursuant to an approved Ground Water Discharge Permit. Implementation of the requirements for existing dischargers will be determined on an individual facility basis at the time of permit renewal and/or modification.

Finally, the discharge of reclaimed wastewater may also be regulated by the New Mexico Construction Industries Division (CID). For example, the use of reclaimed wastewater for indoor plumbing (e.g., toilet flushing, fire suppression) requires approval from CID.

DEFINITIONS

The following definitions are used in this guidance document:

Agronomic Rate: the rate of application of nutrients to plants that is necessary to satisfy the plants' nutritional requirements while strictly minimizing the amount of nutrients that run off to surface waters or which pass below the root zone of the plants.

Class 1A Reclaimed Wastewater: the highest quality reclaimed wastewater described in this guidance document and can be most broadly utilized except for direct consumption. [approved uses listed in Table 1]

Class 1B Reclaimed Wastewater: the second highest quality reclaimed wastewater described in this guidance document and is suitable for uses in which public exposure is likely. [approved uses listed in Table 1]

Class 2 Reclaimed Wastewater: reclaimed wastewater suitable for uses in which public access and exposure is restricted. [approved uses listed in Table 1]

Class 3 Reclaimed Wastewater: reclaimed wastewater suitable for uses in which public access and exposure is prohibited. [approved uses listed in Table 1]

Domestic wastewater: wastewater containing human excreta and water-carried waste from typical residential plumbing fixtures and activities, including but not limited to wastes from toilets, sinks, bath fixtures, clothes or dishwashing machines and floor drains.

Dwelling unit: a structure which contains bedrooms.

Establishment: a structure used as a place of business, education, or assembly.

Flood Irrigation: land application of reclaimed wastewater by ditches, furrows, pipelines, low flow emitters and other non-sprinkler methods.

Food Crops: any crop intended for human consumption.

Grab Sample: an individual sample collected in less than 15 minutes.

Major WWTP: any treatment plant with a maximum design capacity of 1,000,000 gallons or more per day.

Minor WWTP: any treatment plant with a maximum design capacity of less than 1,000,000 gallons per day.

Monthly Geometric Mean: value calculated by taking the sum of the logarithms (sum log x) of each of the data points from the previous calendar month, dividing the sum by the number of data points and then taking the anti-logarithm of the result (10^y = anti-logarithm of 'y').

NTU: nephelometric turbidity units, measured by a nephelometer.

Occupied establishment: any establishment that is occupied regularly at the time of irrigation.

Peak hourly flow: the highest hourly flow rate within a 24 hour period.

Reclaimed wastewater: domestic wastewater that has been treated to the specified levels for the defined uses set forth in this guidance document and other applicable local, state, or federal regulations.

Spray Irrigation: land application of reclaimed wastewater by dispersing it in the air utilizing equipment which provides a low trajectory application and which minimizes misting of the reclaimed wastewater.

3-hour Composite Sample: three effluent portions collected no closer together than one hour (collected between 8:00 am and 4:00 pm) and composited in proportion to flow.

6-hour Composite Sample: six effluent portions collected no closer together than one hour (collected between 8:00 am and 4:00 pm) and composited in proportion to flow.

24-hour Composite Sample: twenty-four effluent portions collected no closer together than one hour and composited in proportion to flow.

30-day Average:

> *For fecal coliform bacteria*: the geometric mean of the values for all effluent samples collected during a calendar month.
>
> *For other than for fecal coliform bacteria*: the arithmetic mean of the daily values for all effluent samples collected during a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

BACKGROUND

This guidance document supersedes the New Mexico Environmental Improvement Division (NMEID) 1985 Policy for the Use of Domestic Wastewater Effluent for Irrigation and NMED's 2003 Policy for the Above Ground Use of Reclaimed Domestic Wastewater. This guidance document establishes reclaimed wastewater quality levels, site restrictions, management practices, and uses for different categories of reclaimed wastewater that are approvable by NMED. Unless an alternative demonstration is proposed by the applicant and accepted by NMED, NMED will propose Ground Water Discharge Permit conditions for above ground discharges of reclaimed wastewater based on the recommendations set forth in this guidance document. While the requirements set forth in this guidance document are deemed protective of public health and the environment, the guidance document does not prevent communities from adopting more stringent requirements.

WASTEWATER TREATMENT PROCESSES

The specified quality levels for Class 1B, Class 2, and Class 3 assume a minimum of conventional secondary wastewater treatment plus disinfection. Class 1A assumes treatment to remove colloidal organic matter, color, and other substances that interfere with disinfection, thereby allowing for the use of the reclaimed wastewater for urban landscaping adjacent to dwelling units or occupied establishments.

GENERAL ABOVE GROUND USE PERMIT CONDITIONS

A. ALL APPROVED USES

1. Whenever reclaimed wastewater is used for any use approved in this guidance document, the wastewater should meet the minimum requirements set forth in this guidance document, unless a demonstration is made that an alternate requirement offers an equivalent protection of public health. The burden of proof for an alternative demonstration rests upon the discharger.
2. Whenever reclaimed wastewater other than Class 1A is used in areas with public access, it should be applied at times and in a manner that minimizes public contact.
3. Whenever reclaimed wastewater is used in areas with restricted public access, the public should be excluded from entering the area.
4. Reclaimed wastewater should only be used for soil compaction or dust control in construction areas where application procedures minimize aerosol drift to public areas.
5. Reclaimed wastewater quality requirements should be measured at the discharge point of the wastewater treatment plant.
6. Signs (in English and Spanish) should be placed at the entrance to areas receiving reclaimed wastewater, and other locations where public access may occur stating: "**NOTICE – THIS AREA IS IRRIGATED WITH RECLAIMED WASTEWATER – DO NOT DRINK**"; "**AVISO – ESTA ÁREA ESTÁ REGADA CON AGUAS NEGRAS RECOBRADAS – NO TOMAR**". Alternate wording may be approved by NMED.
7. All piping, valves and outlets should be color-coded in purple pursuant to the latest revision of the New Mexico Plumbing and Mechanical Code to differentiate piping or fixtures used to convey reclaimed wastewater from piping or fixtures used for potable or other water. All valves, outlets, and sprinkler heads used in reclaimed wastewater systems should be of a type that can only be operated by authorized personnel. Those

portions of reclaimed wastewater systems that are underground and were installed prior to the adoption of this guidance document are exempt from the purple color-coding requirement if all accessible portions of the reclaimed wastewater system are colored purple or clearly labeled as being part of a reclaimed wastewater distribution system.

8. Reclaimed wastewater systems should have no direct or indirect cross connections with potable water systems pursuant to the latest revision of the New Mexico Plumbing and Mechanical Code. For reclaimed wastewater systems that were installed prior to the adoption of this guidance document, the absence of cross connections may be demonstrated via hydrostatic testing or as-built drawings, supported by an affidavit under oath that no cross connection exists.
9. Above ground use of reclaimed wastewater should not result in excessive standing or pooling of wastewater, and should be applied at the appropriate agronomic rate. Irrigation should not be conducted at times when the receiving area is saturated or frozen.
10. The discharge of reclaimed wastewater should be confined to the area designated and approved for receiving the wastewater. Irrigation should be postponed at times when windy conditions may result in drift of reclaimed wastewater outside the designated area of application.
11. Treatment facilities that provide reclaimed wastewater to parks, golf courses, schools and other areas where human exposure is likely must have an emergency storage pond or alternate disposal method where reclaimed wastewater can be diverted during periods when conditions are unfavorable for approved uses or when the quality requirements defined in this guidance document cannot be met.

B. IRRIGATION OF FOOD CROPS

1. Reclaimed wastewater should not be used for the spray irrigation of food crops.
2. Reclaimed wastewater should not be used for surface irrigation of food crops except where there is no contact between the edible portion of the crop and the wastewater, and the wastewater should have a level of quality no less than Class 1B Reclaimed Wastewater (Table 2).

C. IRRIGATION OF FODDER, FIBER AND SEED CROPS

1. Reclaimed wastewater used for the irrigation of pasture to which milking cows or goats have access should have a level of quality no less than Class 2 Reclaimed Wastewater (Table 2).
2. Except pasture for milk-producing animals, reclaimed wastewater used for the irrigation of fodder, fiber and seed crops should have a level of quality no less than Class 3 Reclaimed Wastewater (Table 2).

D. IRRIGATION OF LANDSCAPES

1. Reclaimed wastewater used for irrigation should be applied such that direct and windblown spray is confined to the area designated and approved for application.
2. Reclaimed wastewater used for the irrigation of freeway landscapes and landscapes in other areas where the public has similarly limited access or exposure should have a level of quality no less than Class 2 Reclaimed Wastewater (Table 2). Public access to the irrigation site must be restricted during the period of application.

3. Reclaimed wastewater used for the irrigation of parks, playgrounds, schoolyards, golf courses, cemeteries and other areas where the public has similarly open access should have a level of quality no less than Class 1B Reclaimed Wastewater (Table 2), and the irrigation system should have low trajectory spray nozzles. *Areas which are spray irrigated and located within 100 feet of a dwelling unit or occupied establishment should only receive Class 1A Reclaimed Wastewater* (Tables 2 & 3).

CLASSIFICATION AND USES OF RECLAIMED WASTEWATER

This guidance document identifies four classes of reclaimed wastewater (Class 1A, Class 1B, Class 2, and Class 3) based on reclaimed wastewater quality and the likelihood of public exposure. Table 1 presents the approved uses.

Table 1. Approved Uses for Reclaimed Wastewater by Class

Class of Reclaimed Wastewater	Approved Uses
Class 1A	All Class 1 uses. *No setback limit* to dwelling unit or occupied establishment.
	Backfill around potable water pipes
	Irrigation of food crops[1]
Class 1B	Impoundments (recreational or ornamental)
	Irrigation of parks, school yards, golf courses [2]
	Irrigation of urban landscaping [2]
	Snow making
	Street cleaning
	Toilet flushing
	Backfill around non-potable piping
Class 2	Concrete mixing
	Dust control
	Irrigation of fodder, fiber, and seed crops for milk-producing animals
	Irrigation of roadway median landscapes
	Irrigation of sod farms
	Livestock watering
	Soil compaction
Class 3	Irrigation of fodder, fiber, and seed crops for non-milk-producing animals
	Irrigation of forest trees (silviculture)

[1] Irrigation of food crops should only be allowed for food crops when there is no contact between the edible portion of the crop and the wastewater. Spray irrigation is prohibited for food crops.

[2] If reclaimed wastewater is applied using spray irrigation, the setback limitation of Table 3 "Spray Irrigation" should be observed.

Class 1A reclaimed wastewater may be used for any purpose except direct consumption, food handling and processing, and spray irrigation of food crops. Class 1B reclaimed wastewater may be used where public exposure is likely, and where the appropriate setback requirements are met (Table 3, page 9). Class 2 and Class 3 reclaimed wastewater may be used where public access is restricted with correspondingly less stringent requirements for treatment and disinfection. Any reclaimed wastewater treated to higher quality than the lower classes may be used for the purposes established for the lower classes. *Other uses of reclaimed wastewater not included in Table 1 will be evaluated on a case by case basis by NMED to determine the appropriate water quality classification for the given use.*

WASTEWATER QUALITY LEVELS AND MONITORING PROTOCOL

This section identifies minimum wastewater quality levels and monitoring frequencies for the various classes of reclaimed wastewater. The frequency of wastewater quality monitoring is patterned after U.S. Environmental Protection Agency (USEPA) requirements for discharges of treated and disinfected wastewater to surface waters. Monitoring requirements are dependent on the quality of reclaimed wastewater produced at the treatment plant and the design capacity of the treatment plant. For example, a "major" wastewater treatment plant (having a maximum design capacity of 1 million gallons or more per day) producing Class 1A Reclaimed Wastewater has the most stringent monitoring requirements. The wastewater quality levels and monitoring frequencies for the various classes of reclaimed wastewater are presented in Table 2. In the event that a facility proposes alternative wastewater quality levels and/or monitoring frequencies, it is the responsibility of the facility owner/operator to demonstrate that the alternative proposal provides an equivalent measure of public health protection as the measures set forth in this guidance document.

Table 2. Wastewater Quality Requirements and Monitoring Frequencies by Class of Reclaimed Wastewater

Class of Reclaimed Wastewater	Wastewater Quality Parameter	Wastewater Quality Requirements		Wastewater Monitoring Requirements	
		30-Day Average	Maximum	Sample Type	Measurement Frequency
Class 1A	BOD_5	10 mg/l	15 mg/l	Minimum of 6-hour composite	3 tests per week for major WWTP[1]; 1 test per 2 weeks for minor WWTP
	Turbidity	3 NTU	5 NTU	Continuous	Continuous
	Fecal Coliform	5 per 100 ml	23 per 100 ml	Grab sample at peak flow	3 tests per week for major WWTP; 1 test per week for minor WWTP
	TRC or UV Transmissivity	Monitor Only	Monitor Only	Grab sample or reading at peak flow	Record values at peak hourly flow when Fecal Coliform samples are collected
Class 1B	BOD_5	30 mg/l	45 mg/l	Minimum of 6-hour composite	3 tests per week for major WWTP[1]; 1 test per 2 weeks for minor WWTP
	TSS	30 mg/l	45 mg/l	Minimum of 6-hour composite	3 tests per week for major WWTP[1]; 1 test per 2 weeks for minor WWTP
	Fecal Coliform	100 organisms per 100 ml	200 organisms per 100 ml	Grab sample at peak flow	3 tests per week for major WWTP; 1 test per week for minor WWTP
	TRC or UV Transmissivity	Monitor Only	Monitor Only	Grab sample or reading at peak flow	Record values at peak hourly flow when Fecal Coliform samples are collected

Table 2. Wastewater Quality Requirements and Monitoring Frequencies by Class of Reclaimed Wastewater (continued)

Class of Reclaimed Wastewater	Wastewater Quality Parameter	Wastewater Quality Requirements		Wastewater Monitoring Requirements	
		30-Day Average	Maximum	Sample Type	Measurement Frequency
Class 2	BOD_5	30 mg/l	45 mg/l	Minimum of 6-hour composite for major WWTP; Grab sample for minor WWTP	1 test per week for major WWTP; 1 test per month for minor WWTP
	TSS	30 mg/l	45 mg/l	Minimum of 6-hour composite for major WWTP; Grab sample for minor WWTP	1 test per week for major WWTP; 1 test per month for minor WWTP
	Fecal Coliform	200 organisms per 100 ml	400 organisms per 100 ml	Grab sample at peak hourly flow	1 test per week for major WWTP; 1 test per month for minor WWTP
	TRC or UV Transmissivity	Monitor Only	Monitor Only	Grab sample or reading at peak hourly flow	Record values at peak hourly flow when Fecal Coliform samples are collected
Class 3	BOD_5	30 mg/l	45 mg/l	Minimum of 3-hour composite for major WWTP[5]; Grab sample for minor WWTP	1 test per week for major WWTP; 1 test per month for minor WWTP
	TSS	75 mg/l	90 mg/l	Minimum of 3-hour composite for major WWTP; Grab sample for minor WWTP	1 test per week for major WWTP; 1 test per month for minor WWTP
	Fecal Coliform	1,000 organisms per 100 ml	5,000 organisms per 100 ml	Grab sample at peak hourly flow	1 test per week for major WWTP; 1 test per month for minor WWTP
	TRC or UV Transmissivity	Monitor Only	Monitor Only	Grab sample or reading at peak hourly flow	Record values at peak hourly flow when Fecal Coliform samples are collected

Note: *E*. coli may be used in place of Fecal Coliform as an indicator organism, once an equivalency has been established.

ACCESS RESTRICTIONS AND SET-BACK REQUIREMENTS

Table 3 presents the access controls and setback distances necessary to minimize direct and indirect public exposure to reclaimed wastewater. Setback distances recommended in this guidance document are in all cases the distance from the edge of any area receiving reclaimed wastewater to well casings, dwelling units, or occupied establishments.

In addition to the setbacks described in Table 3, all water supply wells within 200 feet of a wetted irrigation area must be evaluated for adequate well head construction and irrigation practices to ensure protection of ground water. NMED may impose additional setbacks as needed to make certain that the application of reclaimed wastewater does not threaten ground water resources.

Table 3. Access Restrictions and Set Back Requirements

Class of Reclaimed Wastewater	Spray Irrigation	Flood Irrigation and Surface Drip Irrigation
Class 1A	• No access control • No setback to dwelling unit or occupied establishment • Low pressure/low trajectory irrigation system only	• No access control
Class 1B	• No access control; irrigate at times when public exposure is unlikely • 100 ft set-back from dwelling unit or occupied establishment • Low pressure/low trajectory irrigation system only	• No access control; irrigate at times when public exposure is unlikely
Class 2	• Access restricted by perimeter fencing using 4-strand barbed wire and locking gate or other NMED approved access controls • 100 ft set-back from dwelling unit or occupied establishment • Low pressure/low trajectory irrigation system only	• Access restricted by perimeter fencing using 4-strand barbed wire and locking gate, or other NMED approved access controls
Class 3	• Access restricted by perimeter fencing using 4-strand barbed wire and locking gate • 500 ft set-back from dwelling unit or occupied establishment • Low pressure/low trajectory irrigation system only	• Access restricted by perimeter fencing using 4-strand barbed wire and locking gate • 100 ft set-back to dwelling unit or occupied establishment.

Appendix C
Historical Flow Data and Water Rights

CITY OF CARLSAD
WWT EFFLUENT DISCHARGE TO PECOS RIVER
ACRE / FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL FLOW
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1994	240.57	203.47	229.25	241.43	284.21	290.90	343.16	345.93	331.81	324.23	275.46	258.43	*3,368.85*
1995	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1999	321.96	281.14	277.87	284.86	325.79	338.14	368.30	364.52	353.57	350.40	329.14	305.76	*3,901.45*
2000	275.31	248.42	260.88	233.80	316.16	282.37	276.77	278.69	311.94	258.03	349.52	325.73	*3,417.62*
2001	272.21	204.60	217.67	191.40	142.09	236.98	244.68	224.77	225.64	195.79	254.84	265.78	*2,676.45*
2002	266.35	232.01	263.62	256.99	225.81	190.74	250.02	214.79	206.30	244.07	207.28	239.84	*2,797.82*
2003	195.98	143.44	168.79	155.94	169.64	151.16	185.64	183.40	174.65	209.24	209.88	236.34	*2,184.10*
2004	232.32	213.56	223.88	291.51	274.82	213.81	209.05	186.17	199.53	241.73	280.59	208.26	*2,775.23*
2005	184.13	164.12	178.11	168.66	206.41	168.17	167.37	181.58	157.77	173.60	147.12	169.92	*2,066.96*
2006	141.87	127.02	172.99	140.40	140.92	169.70	174.86	188.76	197.39	185.97	178.88	182.23	*2,000.99*
2007	175.29	153.32	169.55	166.88	207.94	153.26	271.96	303.14	316.00	351.48	364.76	305.84	*2,939.42*
2008	259.44	239.22	252.53	246.40	228.69	180.08	206.35	210.09	240.35	261.89	258.89	171.21	*2,755.14*
2009	358.99	231.11	189.22	175.11	196.47	196.37	167.43	158.99	147.30	182.56	165.29	186.18	*2,355.02*
2010	179.80	164.40	171.85	172.47	136.28	138.37	220.04	174.07	196.08	190.49	192.02	181.35	*2,117.22*
2011	177.75	161.00	153.44	128.22	131.87	132.52	140.71	144.86	149.98	149.77	158.14	176.47	*1,804.73*
2012	177.26	133.35	158.96	132.17	197.54	139.17	163.09	149.43	143.97	124.39	140.86	183.20	*1,843.39*
2013	174.54	155.21	161.36	131.65	121.07	133.60	175.46	164.14	177.28				*1,394.31*

CITY OF CARLSAD
WWTF EFFLUENT REUSE
ACRE / FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*
2004	18.94	15.45	17.52	25.36	40.46	43.55	50.58	38.81	31.31	20.14	7.82	8.08	*318.02*
2005	6.96	5.99	14.35	35.49	31.91	43.54	45.14	30.45	37.52	25.95	25.12	20.74	*323.16*
2006	22.68	22.17	23.21	37.40	49.95	99.47	207.81	72.92	23.20	34.28	20.50	17.75	*631.34*
2007	13.63	13.91	24.14	31.79	27.52	49.34	36.59	38.53	32.68	25.42	12.77	13.64	*319.96*
2008	15.06	20.54	21.83	41.29	46.49	48.50	35.56	40.95	22.85	38.63	26.92	7.18	*365.80*
2009	16.77	20.71	26.54	40.51	39.84	41.08	44.08	51.38	49.33	43.70	27.62	11.71	*413.27*
2010	16.58	8.89	23.08	31.79	62.07	61.63	15.10	49.33	28.02	29.55	21.36	18.51	*365.91*
2011	14.69	8.13	38.05	54.54	56.44	52.72	55.45	50.42	49.73	44.67	23.78	7.38	*456.00*
2012	5.82	10.40	24.91	46.25	37.18	50.67	42.51	59.86	50.03	26.67	15.56	8.15	*378.01*
2013	8.68	7.48	21.68	38.81	58.76	53.68	37.15	36.50	21.42				*284.16*

C-76 WATER RIGHTS PUMPING ORDER

NO.	FROM	FILE ORIGINAL	ACRE FEET DIVERSION	ACRE FEET CONSUMPTION	REQUIRED RF	CUMMULATIVE DIVERSION	CUMM RF
1	Declaration as amended	C-76 et al	3,599.00	3,599.00	-	3,599.00	0
2	Blake & Spruill	C-386	465.00	465.00	-	4,064.00	0
3	Blake & Spruill	C-387	401.00	401.00	-	4,465.00	0
4	La Huerta	C-990	2.80	2.80	-	4,467.80	0
5	La Huerta	C-227	7.44	7.44	-	4,475.24	0
6	La Huerta	C-227A	1.44	1.44	-	4,476.68	0
7	La Huerta	C-227AB	15.00	15.00	-	4,491.68	0
8	La Huerta	C-798	15.00	15.00	-	4,506.68	0
9	Hipps*	C-494A	24.00	24.00	-	4,530.68	0
10	La Huerta	C-852	15.00	15.00	-	4,545.68	0
11	Daughtery	C-1045	9.00	9.00	-	4,554.68	0
12	Happy Valley Farm	C-494	249.27	249.27	-	4,803.95	0
13	Golf Course (1)	1934A	59.78	59.78	-	4,863.73	0
14	Golf Course (1)	1934A	34.86	34.86	-	4,898.59	0
15	Golf Course (1)	1934A	78.33	78.33	-	4,976.92	0
16	Golf Course (1)	1934A	112.00	112.00	-	5,088.92	0
17	Golf Course (1)	1934A	64.89	64.89	-	5,153.81	0
18	Harroun Farm	302 & C-484	3,500.00	2,450.00	1,050.00	8,653.81	1,050.00
19	Kirkes	C-113	51.90	36.33	15.57	8,705.71	1,065.57
20	Klein	C-149	258.00	180.60	77.40	8,963.71	1,142.97
21	Klein, Jr.	C-446	294.90	206.43	88.47	9,258.61	1,231.44
22	N-REN	C-612	441.00	308.07	132.93	9,699.61	1,364.37
23	Albright	C-126-C	27.00	18.90	8.10	9,726.61	1,372.47
24	Bonnell	C-632	15.00	10.50	4.50	9,741.61	1,376.97
25	Garner	C-47 - C-47 Enlarged A	60.00	42.00	18.00	9,801.61	1,394.97
26	Riverside Country Club	C-157-C	7.80	5.46	2.34	9,809.41	1,397.31
27	Standpipe Acres, Inc.	C-126-A	18.00	12.60	5.40	9,827.41	1,402.71
28	Toothman	C-446A	9.60	6.72	2.88	9,837.01	1,405.59
29	Riverside Country Club	C-139A	30.00	21.00	9.00	9,867.01	1,414.59
30	IMC	C-110 - C-111	1,470.52	1,470.52	-		
31	IMC	C-110 - C-111	191.55	191.55	-		
32	IMC	C-110 - C-111	637.93	637.93	-		
33	Shooting Range (2)	C-1549 (C-2733)	3.00	3.00	-		
34	Wood Farm (3)	C-180, C-180-S, C-181	416.10	416.10	-		
	TOTALS		12,586.11	11,171.52	1,414.59		

(1) Multiple Purpose of Use, Points of Diversion
(2) 3 AFY transferred in with additional 17 AFY from C-76 allowed to be diverted from Shooting Range
(3) Diversion amount depends upon use (Total Annual of 416.1 AF) = (AF for irrigation) + (1.43 x AF for "municipal related use
√ Stand-alone in Waters Database

Rights shall be pumped in numerical order shown.
When IMC rights become available for pumping
from C-76 they will be renumbered 1, 2, and 3 respectively, and all others renumbered accordingly)

SHEEP DRAW WELLFIELD SUMMARY (C-76 et al.)

FROM	TRANSFER DATE	ORIGINAL FILE	APPROVED DIVERSION ACRE FEET	APPROVED CONSUMPTION ACRE FEET	RETURN FLOW REQUIRED	ORIGINAL PRIORITY DATE	POST HARROUN PRIORITY
Declaration as amended	1948	C-76 et al	3,599 00	3,599.00	-	1948	1883
Blake & Spruill	1952	C-386	465.00	465.00	-	1945	1883
Blake & Spruill	1952	C-387	401 00	401.00	-	1928-48	1883
Harroun Farm	1965	302 & C-484	3.500.00	2.450.00	1.050.00	1883	Unc
La Huerta	1970	C-990	2.80	2.80	-	1941	1883
La Huerta	1970	C-227	7.44	7.44	-	1944	1883
La Huerta	1970	C-227A	1.44	1.44	-	1944	1883
La Huerta	1970	C-227AB	15.00	15.00	-	1944	1883
La Huerta	1971	C-798	15.00	15.00	-	1944	1883
Hipps[1]	1973	C-494A	24.00	24.00	-	?	1883
Kirkes	1977	C-113	51.90	36.33	15 57	?	1883
Klein	1977	C-149	258.00	180.60	77.40	1941	1883
Klein, Jr.	1977	C-446	294.90	206 43	88 47	1931	Unc √
La Huerta	1977	C-652	15.00	15.00	-	1947	1883
N-REN	1977	C-612	441.00	308.07	132 93	Decl	1883
Albright	1979	C-126-C	27.00	18.90	8.10	?	1883
Bonnell	1979	C-632	15.00	10.50	4.50	1944	1883 √
Garner	1979	C-47 - C-47 Enlarged A	60.00	42.00	18 00	1943	1883 √
Riverside Country Club	1982	C-157-C	7.80	5.46	2 34	1938	1883
Standpipe Acres, Inc.	1982	C-126-A	18.00	12.60	5.40	1937	1883
Toothman	1983	C-446A	9.60	6.72	2.88	1930	1883
Riverside Country Club	1986	C-139A	30.00	21.00	9.00	1933	1883
Daughtery	1998	C-1045	9.00	9.00	-	1940	1883
Happy Valley Farm	1998	C-494	249.27	249.27	-	1940	1883
Golf Course[2]	2000	1934A	59.78	59.78	-	1909	Unc
Golf Course[2]	2000	1934A	34.86	34.86	-	1931	Unc
Golf Course[2]	2000	1934A	78.33	78.33	-	1905	Unc
Golf Course[2]	2000	1934A	112 00	112.00	-	1930	Unc
Golf Course[2]	2000	1934A	64.89	64.89	-	1929	Unc
Wood Farm[3]	2005	C-180, C-180-S, C-181	416.10	416.10	-	1932	Unc
TOTAL (EXCLUDING WOOD FARM RTS)			**9,867.01**	**8,452.42**	**1,414.59**		
TOTAL (INCLUDING MAX WOOD FARM RTS)			**10,283.11**	**8,868.52**	**1,414.59**		

√ Stand-alone in Waters Database

(1) Found Change of Owner, but not transfer document

(2) Multiple Purpose of Use, Points of Diversion

(3) Diversion amount depends upon use (Total Annual of 416.1 AF) = (AF for irrigation) + (1 43 x AF for "municipal related uses")

WARNING #1: The Wood Farm well is metered separately from the master meter for Sheep Draw wellfield. The two readings must be added together to properly calculate total diversion

WARNING #2: Because the amount of water that may be diverted/consumed under the Wood Farm right depends upon how that water is used, the total for Sheep Draw diversion/consumtion can vary, too.

	DIVERSION	CONSUMPTION
HIGH	10,283.11	8,868.52
LOW	10,157.99	8,743.40

SHEEP DRAW

MOB'S Records show the return flow requirement is 1414.7 ac ft
The Cooperative Water Agreements between the City and ISC regarding excess discharges of effluent contain a provision in III.E. in which ISC agrees that "The City's effluent return flow obligation under OSE Permit No. C-76 et al. is 1,414 7 acre-feet per annum."

RIGHTS NOT TO BE ADDED TO SHEEP DRAW'S TOTAL PERMITTED DIVERSION

FROM	TRANSFER DATE	ORIGINAL FILE	APPROVED DIVERSION ACRE FEET	APPROVED CONSUMPTION ACRE FEET	RETURN FLOW REQUIRED	ORIGINAL PRIORITY DATE	POST HARROUN PRIORITY
IMC [1]	2000	C-110 - C-111	1,470.52	1.470.52	-	1883	Unc
IMC [1]	2000	C-110 - C-111	191.55	191.55	-	1909	Unc
IMC [1]	2000	C-110 - C-111	637.93	637.93	-	1919	Unc
Shooting Range [2]	2003	C-1549 (C-2733)	3.00	3.00	-	2000	Unc
TOTALS			2,303.00	2,303.00	-		

[1] When the City purchased these rights from IMC-Kalium, the City agreed that IMC could use them for 40 years (until May 1, 2039). See City Contract No. WC-103. Do not count them toward Sheep Draw's total diversion until then.

[2] This is a Drinking and Sanitation right (granted under Sec. 72-12-1). The 3 A-F can only be pumped from the Shooting Range well, not the C-76 wells. However, in order to prevent any over pumping, in March 2003, the City had this well designated as a supplemental well for 17 A-F of C-76 Rights. Therefore, a total of 20 A-F per year may be pumped out of the Shooting Range well.

WARNING: Any water pumped from the Shooting Range well in excess of 3 A-F per year MUST be counted as part of the Sheep Draw (C-76, et al.) diversion/consumption.

Sheep Draw #2

PRIORITY DATE RECONCILIATION
SHEEP DRAW WELLFIELD SUMMARY
HARROUN PRIORITY DATE EXCHANGE

FROM	TRANSFER DATE	ORIGINAL FILE	APPROVED DIVERSION ACRE FEET	PRIORITY DATE
Harroun	1999	302 & C-484 et al	5,773.88	1883
Sheep Draw	1999	C-76-S et al	(3,599.00)	1948-50
Sheep Draw	1999	C-386	(465.00)	1945
Sheep Draw	1999	C-652D	(15.00)	1947
Sheep Draw	1999	C-652	(15.00)	1947
Sheep Draw	1999	C-798	(15.00)	1944
Sheep Draw	1999	C-227AB	(15.00)	1944
Sheep Draw	1999	C-227A	(1.44)	1944
Sheep Draw	1999	C-227	(7.44)	1944
Sheep Draw	1999	C-990	(2.80)	1941
Sheep Draw	1999	C-494	(249.27)	1940
Sheep Draw	1999	C-1045	(9.00)	1940
Sheep Draw	1999	C-612	(441.00)	Decl
Sheep Draw	1999	C-149	(258.00)	?
Sheep Draw	1999	C-113	(51.90)	?
Sheep Draw	1999	C-387	(401.00)	1928-48
Sheep Draw	1999	C-494A	(24.00)	?
Sheep Draw	1999	C-126C	(27.00)	?
Sheep Draw	1999	C-632	(15.00)	1944
Sheep Draw	1999	C-47 & C-47A Enlarged	(60.00)	1943
Sheep Draw	1999	C-157C	(7.80)	1938
Sheep Draw	1999	C-126A	(18.00)	1937
Sheep Draw	1999	C-139A	(30.00)	1933
Sheep Draw	1999	C-446A	(9.60)	1930
TOTALS			**36.63**	

PRIORITY RECOMM

GOLF COURSE SURFACE
(1934A)

FROM	TRANSFER DATE	ORIGINAL FILE	APPROVED DIVERSION ACRE FEET	APPROVED CONSUMPTION	RETURN FLOW REQUIRED	PRIORITY DATE
City	1970	1934A	160.00	160.00	-	1930
City	1970	C-474	111.90	111.90	-	1905
City	1974	303 & 1848E	49.80	49.80	-	1931
City	1977	303 & 1848E	85.44	85.44	-	1909
City	1987	302 & 1848	92.70	92.70	-	1929
					-	
					-	
					-	
					-	
					-	
					-	
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					-	
					-	
					-	
					-	
TOTALS			499.84	499.84	-	

DOUBLE EAGLE WATER RIGHTS PERMIT SUMMARY

1/4	1/4	1/4	T	R	S	FILE NUMBER	WELL NAME	APPROVED DIVERSION ACRE FEET	PERMIT DATE	WATER EASEMENT NUMBER
SW	NE		16S	31E	13	L-3852	Ambassador #4)			W-661
SW	SE	SW	16S	31E	13	L-3852-X	Ambassador #3)	375		W-661
SW	NE	NE	16S	31E	13	L-3852-X-2	Ambassador #1)			W-661
SW	SE	SE	15S	32E	31	L-3853	Caprock #1)			W-661
SW	SW	SW	15S	32E	31	L-3853-X	Caprock #2)			W-661
SE	SW		15S	32E	36	L-4765	Caprock #13)			W-661
SW	SE		15S	32E	31	L-4914	Caprock #3)			W-661
SW	SW	SW	15S	32E	32	L-4918	Caprock #4)			W-384
SW	SE	SW	15S	32E	32	L-4918-X	Caprock #5)			W-384
SW	SW	SE	15S	32E	32	L-4918-X-2	Caprock #6)			W-384
SW	SE	SE	15S	32E	32	L-4918-X-3	Not Drilled			
SE	SW		15S	32E	33	L-4918-X-4	Not Drilled			
SE	SE		15S	32E	34	L-4918-X-5	Not Drilled	2123		
SE	SE		15S	32E	33	L-4918-X-6	C-5)			W-661
SW	SW		15S	32E	34	L-4918-X-7	Caprock #18)			W-661
SE	SW		15S	32E	34	L-4918-X-8	Not Drilled			
SW	SE		15S	32E	34	L-4918-X-9	C-4)			W-661
SW	SW		15S	32E	35	L-4918-X-10	Caprock #10)			W-661
SE	SW		15S	32E	35	L-4918-X-11	C-3)			W-661
SW	SE		15S	32E	35	L-4918-X-12	Not Drilled, aka C-12)			W-661
SW	NE		15S	32E	35	L-4918-X-13	Caprock #20)			W-661
SW	SW	SW	15S	32E	36	L-4918-X-14	Caprock #17)			W-661
SE	SE	SW	15S	33E	31	L-3967	C-6)			W-661
NE	NE		15S	33E	31	L-3967-S	Not Drilled			
SE	NW		15S	33E	32	L-3967-S-2	Not Drilled	1280		W-511
SW	SW		15S	33E	31	L-3967-X	Caprock #19)			W-661
SE			15S	33E	31	L-4565	Caprock #16)			W-661

DOUBLE EAGLE WATER RIGHTS PERMIT SUMMARY

1/4	1/4	1/4	T	R	S	FILE NUMBER	WELL NAME	APPROVED DIVERSION ACRE FEET	PERMIT DATE	WATER EASEMENT NUMBER
NE	SE		16S	34E	7	L-4566	Caprock #14)	263		W-661
NW	SW	NW	16S	34E	18	L-4566-S-2	Caprock #21)			W-661
SW	NW		16S	34E	18	L-4566-S	C-1)			W-661
NE	SE		16S	34E	18	L-4566-S-3	C-2)			W-661
	SE	NW	16S	32E	36	L-4737	Frontier #1)	70		W-661
	SW	SW	16S	32E	36	L-4737-X	Not Drilled			
			16S	34E	5	L-5061	Not Drilled			
SW	SE		16S	34E	7	L-5061-X	Caprock #15A)	1,200		W-661
						L-5061-X-2	Not Drilled			
						L-5061-X-3	Not Drilled			
S 1/2			16S	32E	36	L-5494	Frontier #2 - Not Drilled	165		W-661
			16S	32E	36	L -5667	Frontier #3)			W-661
			16S	34E	6	L-5534	Not Drilled			
			16S	34E	6	L-5534 - X	Not Drilled	1372		
			16S	34E	6	L-5534 - X-2	Not Drilled			
SE	SE	SE	16S	34E	7	L-5713	Hudson #1)	800		W-661
								7,648		

NOTE: f Public Lands Water Easement No. W-661 also includes:
Sec. 14, T16S, R25E (No Wells)
Sheep Draw Wells, City No. 4 & 5 (C-76-S-4 and C-76-S-5) on Sec. 2, T22S, R25E

TATUM WATER RIGHTS PERMIT SUMMARY
(L-7319, et al)

LOCATION						FILE NUMBER	PERMIT DATE	APPROVED DIVERSION ACRE FEET
1/4	1/4	1/4	S	T	R			
SW	SE	SE	31	13S	34E	L-7319	1976	
SW	SW	SE	31	13S	34E	L-7319-S	1976	
SW	SE	SW	31	13S	34E	L-7319-S2	1976	
SW	SW	SW	31	13S	34E	L-7319-S3	1976	
SW	SW	SW	32	13S	34E	L-7319-S4	1976	
SW	SW	SW	33	13S	34E	L-7319-S5	1976	
SW	SE	SE	32	13S	34E	L-7319-S6	1976	
SW	SE	SW	32	13S	34E	L-7319-S7	1976	
SW	SW	SE	32	13S	34E	L-7319-S8	1976	
SW	SE	SW	33	13S	34E	L-7319-S9	1976	
								3,040
SW	SW	SE	36	14S	32E	L-7320	1976	
SE	NE	NE	25	14S	32E	L-7320-S	1976	
SE	SE	NE	25	14S	32E	L-7320-S2	1976	
SE	NE	SE	25	14S	32E	L-7320-S3	1976	
SE	SE	SE	25	14S	32E	L-7320-S4	1976	
SW	SW	SW	36	14S	32E	L-7320-S5	1976	
SW	SE	SW	36	14S	32E	L-7320-S6	1976	
SW	SE	SE	36	14S	32E	L-7320-S7	1976	
								2,432
SW	SE	SW	31	14S	33E	L-7321	1976	
SW	SE	SE	31	14S	33E	L-7321-S	1976	
SW	SW	SE	32	14S	33E	L-7321-S2	1976	
SW	SW	SW	31	14S	33E	L-7321-S3	1976	
SW	SE	SW	32	14S	33E	L-7321-S4	1976	
SW	SE	SE	32	14S	33E	L-7321-S5	1976	
SW	SW	SW	33	14S	33E	L-7321-S6	1976	
SW	SW	SW	32	14S	33E	L-7321-S7	1976	
SW	SW	SE	31	14S	33E	L-7321-S8	1976	
							1976	2,736

TATUM WATER RIGHTS PERMIT SUMMARY
(L-7319, et al)

LOCATION						FILE NUMBER	PERMIT DATE	APPROVED DIVERSION ACRE FEET
1/4	1/4	1/4	S	T	R			
SW	SW	SW	32	14S	34E	L-7322	1976	
SW	SE	SW	31	14S	34E	L-7322-S	1976	
SW	SW	SW	31	14S	34E	L-7322-S2	1976	
SW	SE	SW	32	14S	34E	L-7322-S3	1976	
SW	SW	SE	31	14S	34E	L-7322-S4	1976	
SW	SE	SE	31	14S	34E	L-7322-S5	1976	
								1,824
SW	SW	SW	31	15S	34E	L-7324	1976	
SW	SE	SW	31	15S	34E	L-7324-S	1976	
								608
TOTALS								10,640

LOWER LAKE PERMANENT TRANSFER
(303 & 1848)

FROM	TRANSFER DATE	ORIGINAL FILE	APPROVED DIVERSION ACRE FEET	APPROVED CONSUMPTION	RETURN FLOW REQUIRED	PRIORITY DATE
Western Farms						
33 ac	1969	303 & 1848	99.00	69.30	29.70	1909
4.25 ac	1969	303 & 1848	12.75	8.93	3.82	1920
37.13 ac	1969	303 & 1848	111.39	77.97	33.42	1909
2.87 ac	1969	303 & 1848	8.61	6.03	2.58	1920
7.31 ac	1969	303 & 1848	21.93	15.35	6.58	1909
16.8 ac	1969	303 & 1848	50.40	35.28	15.12	1909
17.5 ac	1969	303 & 1848	52.50	36.75	15.75	1920
5.7 ac	1969	303 & 1848	17.10	11.97	5.13	1929
					-	
					-	
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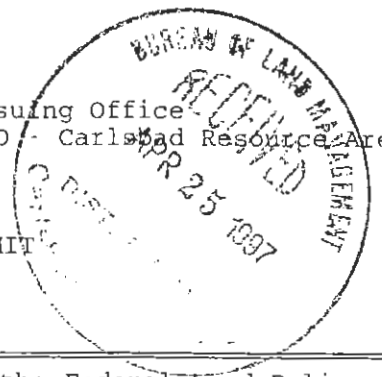
					-	
					-	
					-	
TOTALS			373.68	261.58	112.10	

Appendix D
Existing Easements

FORM 2800-14
(August 1985)

Issuing Office
RDO - Carlsbad Resource Area



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
RIGHT-OF-WAY GRANT/TEMPORARY USE PERMIT

SERIAL NUMBER: NM NM-97956

1. A right-of-way is hereby granted pursuant to Title V of the Federal Land Policy and Management Act of October 21, 1976 (90 Stat. 2776; 43 U.S.C. 1761).

2. Nature of Interest:

a. By this instrument, the holder:

City of Carlsbad
P. O. Box 1569
Carlsbad, NM 88221-1569

receives a right to construct, operate, maintain, and terminate a 10-inch buried asbestos cement effluent pipeline on public lands described as follows:

T. 22 S., R. 27 E., NMPM
Section 03: Lot 2, SW¼NE¼, W½SE¼;
Section 10: W½NE¼.

The lands described above contain a total length of 1.280 miles.

b. The right-of-way or permit area granted herein is 50 feet wide, 6759.51 feet long and contains 7.759 acres, more or less. If a site type facility, the facility contains N/A acres.

c. This instrument shall terminate on April 28, 2027, 30 years from the effective date of this grant unless prior thereto, it is relinquished, abandoned, terminated, or modified pursuant to the terms and conditions of this instrument or of any applicable Federal law or regulation.

d. This instrument may be renewed. If renewed, the right-of-way or permit shall be subject to the regulations existing at the time of renewal and any other terms and conditions that the authorized officer deems necessary to protect the public interest.

e. Notwithstanding the expiration of this instrument or any renewal thereof, early relinquishment, abandonment, or termination, the provisions of this instrument, to the extent applicable, shall continue in effect and shall be binding on the holder, its successors, or assigns, until they have fully satisfied the obligations and/or liabilities accruing herein before or on account of the expiration, or prior termination, of the grant.

3. Rental:

For and in consideration of the rights granted, the holder agrees to pay the Bureau of Land Management fair market value rental as determined by the authorized officer unless specifically exempted from such payment by regulation. Provided, however, that the rental may be adjusted by the authorized officer, whenever necessary, to reflect changes in the fair market rental value as determined by the application of sound business management principles, and so far as practicable and feasible, in accordance with comparable commercial practices.

4. Terms and Conditions:

a. This grant or permit is issued subject to the holder's compliance with all applicable regulations contained in Title 43 Code of Federal Regulations part 2800.

b. Upon grant termination by the authorized officer, all improvements shall be removed from the public lands within 90 days, or otherwise disposed of as provided in paragraph (4)(d) or as directed by the authorized officer.

c. Each grant issued for a term of 20 years or more shall, at a minimum, be reviewed by the authorized officer at the end of the 20th year and at regular intervals thereafter not to exceed 10 years. Provided, however, that a right-of-way or permit granted herein may be reviewed at any time deemed necessary by the authorized officer.

d. The stipulations, plans, maps, or designs set forth in Exhibits A, B, & C, dated March 17, 1997, attached hereto, are incorporated into and made a part of this grant instrument as fully and effectively as if they were set forth herein in their entirety.

e. Failure of the holder to comply with applicable law or any provision of this right-of-way grant or permit shall constitute grounds for suspension or termination thereof.

f The holder shall perform all operations in a good and workmanlike manner so as to ensure protection of the environment and the health and safety of the public.

IN WITNESS WHEREOF, The ~~undersigned~~ agrees to the terms and conditions of this right-of-way grant or permit.

(Signature of Holder)	(Signature of Authorized Officer)
City Administrator	Acting Area Manager, Carlsbad Resource Area
(Title)	(Title)
april 23, 1997	APR 28 1997
(Date)	(Effective Date of Grant)

EXHIBIT A
March 17, 1997

BLM Serial Number: NM- 97956
Company Reference: Golf Course Effluent

BURIED PIPELINE STIPULATIONS FOR THE ROSWELL DISTRICT, BLM

The holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer, BLM.

1. The holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.

2. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, *et. seq.*) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized by this grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act, Section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the Authorized Officer concurrent with the filing of the reports to the involved Federal agency or State government.

3. The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, *et. seq.* or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, *et. seq.*) on the right-of-way (unless the release or threatened release is wholly unrelated to the right-of-way holder's activity on the right-of-way). This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. If, during any phase of the construction, operation, maintenance, or termination of the pipeline, any oil or other pollutant should be discharged, impacting Federal lands, the control and total removal, disposal, and cleaning up of such oil or other pollutant, wherever found, shall be the responsibility of the holder, regardless of fault. Upon failure of the holder to control, dispose of, or clean up such discharge on or affecting Federal lands, or to repair all damages to Federal lands resulting therefrom, the Authorized Officer may take such measures as deemed necessary to control and cleanup the discharge and restore the area, including, where appropriate, the aquatic

March 17, 1997
Exhibit A
NM-97456

environment and fish and wildlife habitats, at the full expense of the holder. Such action by the Authorized Officer shall not relieve the holder of any liability or responsibility.

5. The holder shall conduct all activities associated with the construction, operation, and termination of the right-of-way within the authorized limits of the right-of-way.

6. The pipeline will be buried with a minimum cover of 36 inches between the top of the pipe and ground level.

7. Blading of all vegetation (will/~~will not~~) be allowed. Blading is defined as the complete removal of brush and ground vegetation. Clearing of brush species will be allowed. Clearing is defined as the removal of brush while leaving ground vegetation (grasses, weeds, *etc.*) intact. Clearing is best accomplished by holding the blade 4 to 6 inches above the ground surface. In areas where blading and/or clearing is allowed, the maximum width of these operations will not exceed 50 feet.

8. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair impacted improvements to at least their former state. The holder shall contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence will be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the Authorized Officer.

9. Vegetation, soil, and rocks left as a result of construction, drilling, or maintenance activity will be randomly scattered over the project area and will not be left in rows, piles, or berms, unless otherwise approved by the Authorized Officer. A berm will be left over the ditch line to allow for settling back to grade.

10. In those areas where erosion control structures are required to stabilize soil conditions, the holder shall install such structures as are suitable for the specific soil conditions being encountered and which are in accordance with sound management practices. Any earth work will require prior approval by the Authorized Officer.

11. The holder shall reseed all surface disturbed by construction activities. If reseeding is required, it will be done according the attached seeding requirements (Exhibit B), using seed mixture (1*2*3*4) for loamy sites.

12. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" designated by the Rocky Mountain Five-State Interagency Committee. The color selected for this project is Carlsbad Canyon (formerly sandstone brown), Munsell Soil Color Chart Number 2.5Y 6/2.

March 17, 1997

Exhibit A
NM-97956

13. The holder shall post signs designating the BLM serial number assigned to this right-of-way grant at the following locations: the points of origin and completion, or entry to and exit from public lands, of the right-of-way and at all major road crossings. These signs will be posted in a permanent, conspicuous manner, and will be maintained in a legible condition for the term of the right-of-way.

14. The holder shall not use the right-of-way as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder. The holder shall take whatever steps are necessary to ensure that the right-of-way is not used as a roadway.

15. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on the holder's behalf, on public or Federal land shall be immediately reported to the Authorized Officer. The holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to the proper mitigation measures will be made by the Authorized Officer after con{ulting with the holder.

16. The period of time that any trenches or other excavations are kept open will be held to the minimum compatible with construction requirements. The holder shall not leave more than one-half mile of trench open overnight or otherwise unattended. Open trenches will have ramps, bridges, or earthen plugs, at least six feet wide, every one-quarter mile to pass livestock and wildlife.

17. Special Stipulations:

EXHIBIT B
March 17, 1997

BLM Serial No.: NM-97956
Company Reference: Golf Course Effluent

Seed Mixture 1, for Loamy Sites

The holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed will be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed will be either certified or registered seed. The seed container will be tagged in accordance with State law(s) and available for inspection by the authorized officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). The holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked of chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed* per acre:

Species	lb/acre
Plains lovegrass (*Eragrostis intermedia*)	0.5
Sand dropseed (*Sporobolus cryptandrus*)	1.0
Sideoats grama (*Bouteloua curtipendula*)	5.0

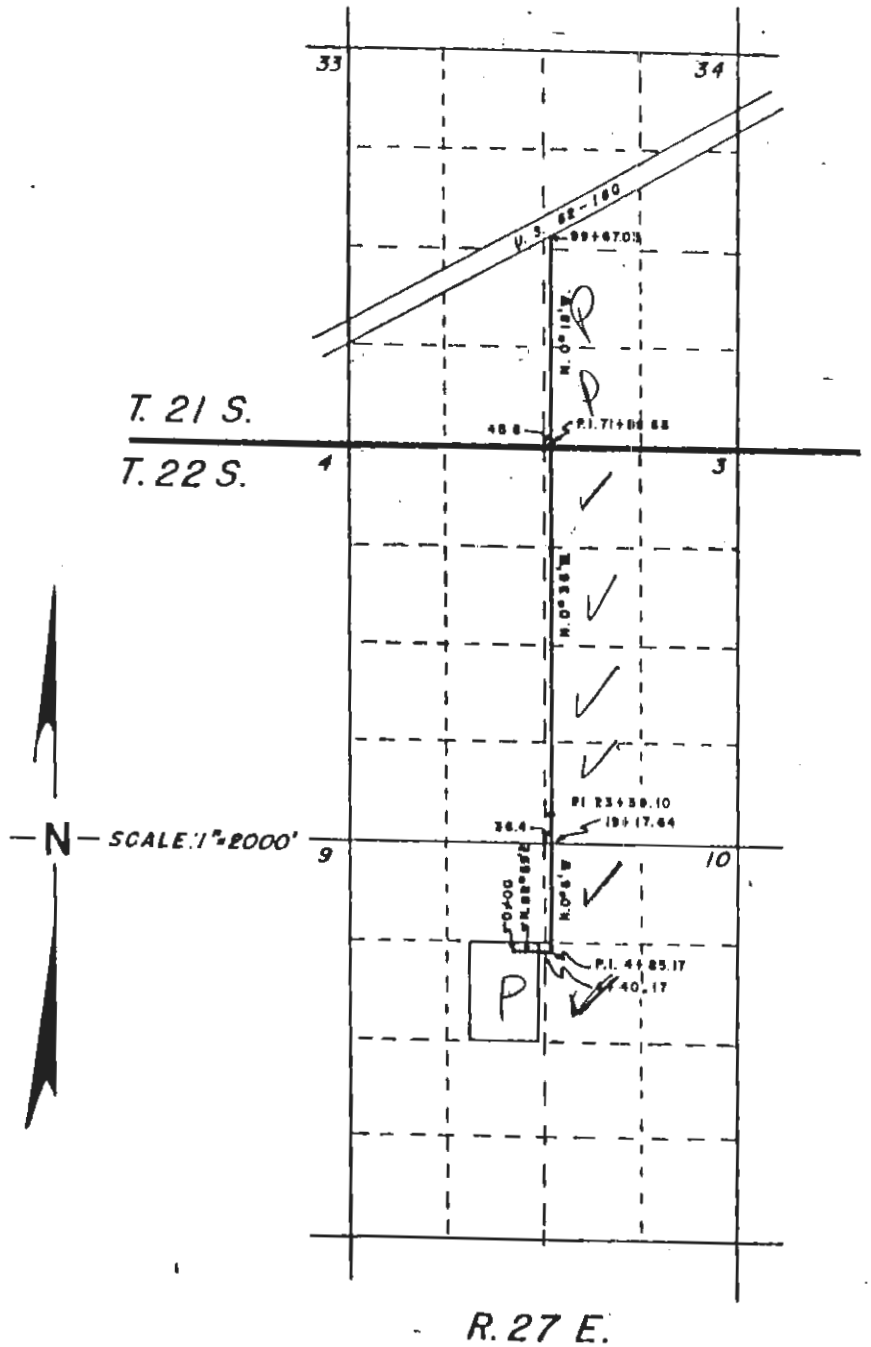
*Pounds of pure live seed:

Pounds of seed x percent purity x percent germination = pounds pure live seed

PLAT OF SURVEY

BEKER RESOURCES, INC.

SEWER PLANT EFFLUENT PIPELINE TO FERTILIZER PLANT



A strip of land 50 feet wide being 25 feet to the left and right of the survey centerline shown hereon.

Section 10, T. 22 S., R. 27 E., length USA R/W = 1477.47
Section 3, T. 22 S., R. 27 E., length USA R/W = 5280.04

Total 6759.51 feet, 409.67 rods, 1.280 miles

Prepared by: Mann Engineering Co.
Date: October 17, 1974

NM 20961

Sheet 2 of 2

E-130

W/3 C; RC, JRT
Anna B, C. Tracy, PA
Di Vault

GRANT OF PIPELINE EASEMENT

Francis G. Tracy, III, a married man dealing in his sole and separate property, his wife, Carrol Tracy, signing pro forma; Charles G. Tracy, a married man dealing in his sole and separate property, his wife, Corinne G. Tracy, signing pro forma; and George G. Eddy, Trustee for the Josephine Eddy Trust (hereinafter "GRANTORS"), for and in the consideration of the CITY's performance of the terms and conditions contained in the Agreement attached hereto as Exhibit "A," the completion and sufficiency of such consideration being acknowledged and confessed, do hereby grant, sell, and convey unto the City of Carlsbad, Eddy County, New Mexico, a municipal corporation whose address is P.O. Box 1569, Carlsbad, NM 88221-1569 and its successors and assigns (referred to herein as "CITY"), a right-of-way and easement herein described upon the following terms and conditions:

1. GRANTORS hereby grant, sell, and convey unto the CITY a right-of-way and easement in, under, on, over, upon, across, and through a strip of land thirty feet (30') in width described as follows:

> See attached Exhibit "C," the Utility Easement legal description, and Exhibit "B," the City of Carlsbad Utility Easement plat and description

for the purpose of surveying, installing, constructing, laying, reconstructing, relaying, using, operating, maintaining, inspecting, repairing, replacing, controlling, and removing two pipelines, together with the conduct of any necessarily connected work, including, but not limited to the CITY's and its agents' use of the easement as a right-of-way for the purpose of surveying, installing, constructing, laying, reconstructing, relaying, using, operating, maintaining, inspecting, repairing, replacing, controlling, or removing the pipelines. The pipelines shall be used solely for the conveyance of sewage and/or treated effluent.

2. During temporary periods, GRANTORS hereby further grant, sell, and convey unto the CITY an additional fifty foot (50') wide right-of-way and easement in, under, on, over, upon, across, and through a strip of land along and adjacent to said thirty feet and further described as follows:

> See attached Exhibit "D" and Exhibit "E," the Temporary Construction Easement legal descriptions, and Exhibit "B," the City of Carlsbad Utility Easement plat and description

for the purpose of surveying, installing, constructing, laying, reconstructing, relaying, maintaining, inspecting, repairing, replacing, controlling, or removing the pipelines.

3. This right-of-way and easement shall carry with it the right of ingress and egress to and from, and access on and along said right-of-way, with the right to use existing roads, for the purpose of surveying, installing, constructing, laying, reconstructing, relaying, using, operating, maintaining, inspecting, repairing, replacing, controlling, and removing the pipelines, together with the conduct of any necessarily connected work. The CITY shall not pave, install a road, or place surfacing materials on any part of the right-of-way and easement. The CITY agrees that it will not open a public roadway upon the land covered by the easement.

Eileen Roach
City of Carlsbad

RECORDER'S MEMORANDUM
This instrument was not adequate for satisfactory recordation due to illegibility, carbon or photocopy, discolored paper, etc. All blockouts, additions & changes were present at the time of recordation.

4. GRANTORS represent and warrant that the GRANTORS are the owners in fee simple of the surface estate of this right-of-way and easement subject to oil and gas leases and other encumbrances, if any of record. This right-of-way and easement is made subject to all restrictions, easements, covenants, conditions, mineral interests, mineral leases, and other matters or encumbrances of record affecting the right-of-way and easement area as described herein as shown in the applicable real estate records of Eddy County, New Mexico.

5. GRANTORS reserve the right of ingress and egress at any and all times for the purpose of prospecting for, mining, and removing oil, gas, potash, and other minerals in, under, and that may be produced from the lands described in Exhibits "C," "D," and "E." GRANTORS' use of the easement shall not be exercised to the detriment of the CITY or otherwise interfere with the CITY's right to use the easement as granted herein.

6. GRANTORS retain the right to permit vehicular and pedestrian traffic across the right-of-way and easement. GRANTORS may, at any time and as desired by GRANTORS, pave or place surfacing materials on any part of the right-of-way and easement for the limited purpose of constructing a roadway that crosses the right-of-way and easement at a perpendicular angle. GRANTORS shall notify the CITY in writing of GRANTORS' intent to construct a roadway sixty (60) days in advance of any construction. GRANTORS' use of the easement shall not be exercised to the detriment of the CITY or otherwise interfere with the CITY's right to use the easement as granted herein.

7. GRANTORS retain the right to construct any irrigation ditches or canals needed or used or to be used by GRANTORS for the irrigation of lands owned by GRANTORS now or in the future. GRANTORS' use of the easement shall not be exercised to the detriment of the CITY or otherwise interfere with the CITY's right to use the easement as granted herein.

8. The CITY agrees that any new pipeline constructed by it upon the easement shall be buried to a minimum depth of five feet (5') from the top of the pipeline to grade. The existing pipeline may remain as it is currently placed except the portion of the existing pipeline shown on Exhibit "F" shall be replaced so that portion of the existing pipeline is buried to a minimum depth of five feet (5') from the top of the pipeline to grade.

9. Any pipeline constructed, laid, or relaid upon the easement shall be a continuous line without risers, pumping stations, or manholes at any point upon the easement. The pipelines shall be permitted to have air vacuum valves upon the easement.

10. The CITY shall take such steps as may be reasonably necessary from time to time to protect and restore the right-of-way and easement from erosion damage resulting from the CITY's exercise of its rights hereunder. The CITY shall pay any reasonable damages which may arise to crops, pasturage or fences of GRANTORS arising from CITY's exercise of the rights granted herein.

11. CITY shall use reasonable diligence to prevent its employees, contractors, or subcontractors from bringing firearms on the right-of-way and easement.

12. Should the CITY vacate or abandon the easement or cease to use the easement for the purposes specified in this document, the easement shall terminate.

13. Upon termination of the easement, the CITY shall remove its pipelines from the easement and shall reseed with appropriate native grass seed mixture or reclaim those undeveloped or nonagricultural areas disturbed by the removal of the pipelines.

14. The CITY agrees that it shall indemnify and hold GRANTORS harmless from any claim, demand, or action for which the CITY would be legally liable that may arise from the negligent action or inaction of the CITY with regards to its surveying, installing, constructing, laying, reconstructing, relaying, maintaining, inspecting, repairing, replacing, controlling, or removing the pipelines. The CITY and its public employees, as defined by the New Mexico Tort Claims Act, do not waive any sovereign immunity, any defense, and/or any limitation of liability pursuant to law. No provision of this Easement modifies and/or waives any provision of the New Mexico Tort Claims Act.

15. All rights, title, and privileges herein granted, including all benefits and burdens, shall run with the land and shall be binding upon and inure to the benefit of the parties, and their respective heirs, executors, administrators, successors, assigns, and legal representatives.

IN WITNESS WHEREOF, the GRANTORS have executed these presents this 28th day of Sept., 2004.

Francis G. Tracy III
FRANCIS G. TRACY, III

Carrol Tracy
CARROL TRACY

STATE OF NEW MEXICO)
)ss
COUNTY OF EDDY)

The foregoing instrument was signed and acknowledged before me this 28th day of Sept., 2004, by FRANCIS G. TRACY and CARROL TRACY, his wife.

My Commission Expires:

Jan 22, 2005

Annette Burns
Notary Public

NOTARY PUBLIC STATE OF NEW MEXICO

CHARLES G. TRACY

CORINNE G. TRACY

STATE OF TEXAS)
)ss
COUNTY OF HARRIS)

The foregoing instrument was signed and acknowledged before me this 15th day of Sept, 2004, by CHARLES G. TRACY and CORINNE G. TRACY, his wife.

My Commission Expires:

12.31.04

Notary Public

KAZUKO MORRISON
Notary Public, State of Texas
My Commission Expires
December 31, 2004

JOSEPHINE EDDY TRUST

GEORGE G. EDDY, TRUSTEE

STATE OF Texas)
)ss
COUNTY OF Travis)

The foregoing instrument was signed and acknowledged before me this 20th day of Sept, 2004, by GEORGE G. EDDY, Trustee for the Josephine Eddy Trust.

My Commission Expires:

BEVERLY LYN PARKER
Notary Public, State of Texas
My Commission Expires
FEBRUARY 8, 2008

Notary Public

EXHIBIT "A"
Consideration for Grant of Pipeline Easement in Perpetuity

THIS AGREEMENT is entered into at Carlsbad, New Mexico, this 13th day of October, 2004, by and between the **CITY OF CARLSBAD**, New Mexico, a municipal corporation, hereinafter referred to as "**CITY**," and **CHARLES G. TRACY**, a married man dealing in his sole and separate property, his wife, Corinne G. Tracy, signing pro forma; **FRANCIS G. TRACY, III**, a married man dealing in his sole and separate property, his wife, Carrol Tracy, signing pro forma; and George G. Eddy, Trustee for the **JOSEPHINE EDDY TRUST** (hereinafter "GRANTORS"),

In and for the consideration of the CITY's performance of the terms and conditions contained herein, the completion and sufficiency of such consideration being acknowledged and confessed, GRANTORS do hereby grant, sell, and convey in perpetuity unto the City of Carlsbad, Eddy County, New Mexico, a municipal corporation whose address is P.O. Box 1569, Carlsbad, NM 88221-1569 and its successors and assigns (hereinafter "CITY"), easements as described in the Grant of Pipeline Easement in Perpetuity to which this Agreement is attached (hereinafter the "Grant of Easement").

I. MONUMENTS AND FENCES

A. The CITY or its agents shall mark with survey monuments GRANTORS' property corners along the east/west property line in the NW1/4 of Section 9, T22S, R27E, N.M.P.M.

B. The CITY shall construct fences along the following property boundaries of GRANTORS':

1. Along the property boundary between the GRANTORS' property and the property owned by Elaine Mead Murphy:
   a. Parallel to the section line between Sections 8 and 9, T22S, R27E, a distance of approximately one thousand three hundred twenty-eight feet (1,328'), with such fence to be placed on the GRANTOR's property ten feet from the boundary with the Murphy property; and
   b. Parallel to the east-west half line of the NW1/4 of Section 9, T22S, R27E, a distance of approximately two thousand six hundred forty-four feet (2,644'), with such fence to be placed on the south edge of the permanent easement.
2. Along the north-south half section line in Sections 3 and 10, T22S, R27E, N.M.P.M., a distance of six thousand three hundred thirty-six feet (6,336').

C. The fences described in Paragraph II(B) shall be:

1. four-strand barbed wire with steel "T" posts drilled or driven in the ground every twelve feet (12');
2. with two (2) twist stays between posts;
3. "H" braces and corners made of three inch (3") steel pipe set in

concrete; and

4. with gates made of steel pipe tubing as specified by the New Mexico State Highway Department.

II. CROP DISRUPTION

A. For crop disruption during the initial construction in the easement, the CITY shall pay Walterscheid Trucking and Farms, Inc., the owner of the crops, Twenty-one Thousand Two Hundred Forty-two Dollars and No/100ths ($21,242.00) per crop year for all disruption and damage done to crops by the activities of the CITY described in this Agreement and in the Grant of Easement.

B. The payment for the first crop year shall be made no less than ten (10) days prior to the commencement of construction on the property included in the Grant of Easement.

C. In the event construction is not completed within the first crop year, the payment for the second crop year shall be made no later than March 10th of the second crop year.

III. EFFLUENT

The CITY and the GRANTORS agree to negotiate an equitable arrangement for delivery of CITY effluent to the property of GRANTORS commonly known as Esperanza Farm, at the north and/or south end of Esperanza Farm for irrigation purposes if the following events occur:

A. The volume of return flow which the Office of the New Mexico State Engineer requires the CITY to return is reduced to allow the CITY to use additional effluent; and

B. All required approvals and permits are obtained to use effluent on Esperanza Farm; and

C. The CITY finds that it has sufficient effluent available to meet all its needs and to deliver to Esperanza Farm.

IV. ANNUAL FEE

A. The CITY shall pay, as an annual fee to Grantors for the Grant of Easement, the sum of Two Thousand Seven Hundred Fifty Dollars and No/100ths ($2,750.00) with the first such annual fee due and payable not later than ten (10) days after the effective date of this Agreement. Thereafter, such fee shall be due and payable not later than ten (10) after each succeeding anniversary date of this Agreement.

B. The fee set forth in Paragraph (IV)(A), above, shall be adjusted annually on the same percentage basis as the rate per One Thousand gallons (1,000 gal.) is adjusted for Carlsbad Municipal Water Users.

V. MISCELLANEOUS PROVISIONS

A. The CITY shall remove those unused poles from the property of the GRANTORS that once held the telemetry line running to the CITY's sewage treatment plant.

B. The CITY shall remove and dispose of the excavation debris left on the surface of GRANTORS' property. That being the debris which was created during the placement of the existing pipeline in 1962.

C. The CITY shall reseed or reclaim those undeveloped or nonagricultural areas disturbed by the activities of the City described in this Agreement and in the Grant of Easement. Reseeding shall be done with appropriate native grass seed mixture.

D. The CITY agrees to provide a ten foot (10') wide easement across CITY property for a pipeline to transport Carlsbad Irrigation District water from the Pecos River to the property commonly known as Orchard Farm, located on Muscatel Avenue and Locust Street, subject to such terms and conditions as the CITY and the owners of Orchard Farm may mutually agree.

CITY OF CARLSBAD:

SEAL

BOB FORREST, MAYOR

ATTEST:

PEARLENE BRADSHAW, CITY CLERK

GRANTORS:

CHARLES G. TRACY

CORINNE G. TRACY

STATE OF TEXAS)
)ss
COUNTY OF HARRIS)

The foregoing instrument was signed and acknowledged before me this 24 day of Sept, 2004, by CHARLES G. TRACY and CORINNE G. TRACY, his wife.

My Commission Expires:

12.31.04

Kazuko Morrison
Notary Public

KAZUKO MORRISON
Notary Public, State of Texas
My Commission Expires
December 31, 2004

Francis G. Tracy III
FRANCIS G. TRACY

Carrol Tracy
CARROL TRACY

STATE OF NEW MEXICO)
)ss
COUNTY OF EDDY)

The foregoing instrument was signed and acknowledged before me this 28th day of Sept., 2004, by FRANCIS G. TRACY and CARROL TRACY, his wife.

My Commission Expires:

Jan 22, 2005

NOTARY PUBLIC STATE OF NEW MEXICO

Annette Burrie
Notary Public

JOSEPHINE EDDY TRUST

GEORGE G. EDDY, TRUSTEE

STATE OF TX)
)ss
COUNTY OF TRAVIS)

The foregoing instrument was signed and acknowledged before me this 20th day of September, 2004, by GEORGE G. EDDY, Trustee for the Josephine Eddy Trust.

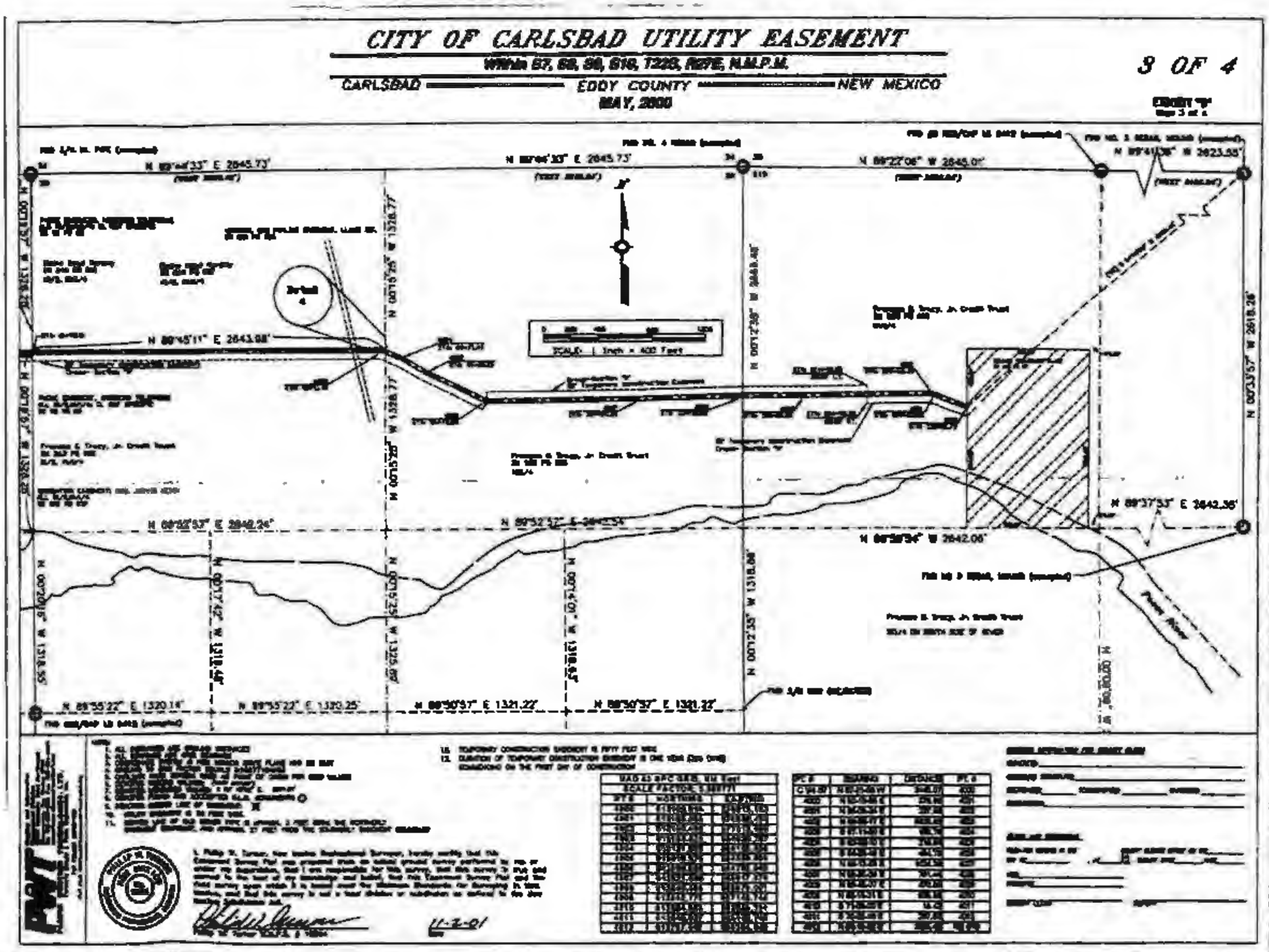
My Commission Expires:
BEVERLY LYN PARKER
Notary Public, State of Texas
My Commission Expires
FEBRUARY 8, 2006

Beverly Parker

Notary Public

CITY OF CARLSBAD UTILITY EASEMENT
CARLSBAD
EDDY COUNTY
NEW MEXICO
MAY, 2009
1 OF 4
PROPERTY CONTROL MAP
EXHIBIT "B"

CITY OF CARLSBAD UTILITY EASEMENT
CARLSBAD
EDDY COUNTY
NEW MEXICO
2 OF 4



CITY OF CARLSBAD UTILITY EASEMENT
Within S7, S8, S9, S18, T22S, R27E, N.M.P.M.
CARLSBAD
EDDY COUNTY
NEW MEXICO
MAY, 2000
3 OF 4
N 89°44'33" E 2645.73'
N 89°22'06" W 2645.01'
N 00°33'57" W 2618.26'
N 89°37'33" E 2642.36'
N 89°58'54" W 2642.06'
N 89°45'11" E 2643.08'
N 00°15'25" W 1328.77'
N 00°12'38" W 2649.48'
N 00°12'35" W 1318.88'
N 89°52'57" E 2642.24'
N 89°55'22" E 1320.14'
N 89°55'22" E 1320.25'
N 89°50'57" E 1321.22'
N 89°50'57" E 1321.22'
SCALE: 1 Inch = 400 Feet
11-2-01

BOOK 570 PAGE 1103

CITY OF CARLSBAD UTILITY EASEMENT
CARLSBAD
EDDY COUNTY
NEW MEXICO
MAY, 2000
4 OF 4
NOTE: DETAILS NOT TO SCALE
Detail 1
Detail 2
Detail 3
Detail 4
Cross-Section "A" of Utility Easement
Cross-Section "B" of Utility Easement

Utility Easement Within the Lands of Francis G. Tracy, III, Charles G. Tracy, and the Josephine Eddy Trust

A utility right-of-way easement for the City of Carlsbad, being that part of a strip of land being 30.00 feet wide from Station 61+95.10 to Station 132+51.75, lying and being situated within sections 9,10, T.22 S., R.27 E., N.M.P.M, in the County of Eddy, State of New Mexico being more particularly described as follows:

Beginning at the NE Corner of Lot Q of the Riverside Farms Subdivision also known as the NW Corner of the S1/2, NW1/4, S9, T.22 S., R. 27 E., N.M.P.M., deeded to Francis G. Tracy, Jr. Credit Trust, filed in the office of Eddy County Clerk, Deed Book of Records 363, Page 805, being True point of Beginning and from whence the NW Corner of said Section 9 being a ¾ inch iron pipe bears N. 00° 19' 57" W., a distance of 1328.28 feet;

Thence N. 89° 45' 11" E. along the boundary of said lands of Francis G Tracy, Jr. Credit Trust and the lands of Elaine Mead Murphy, filed in Book 244, Page 212 a distance of 2,636.95 feet;

Thence S. 67° 11' 50 E. a distance of 7.65 feet to a point on the latitudinal quarter section line of said section 9;

Thence S. 67° 11' 50" E. a distance of 137.26 feet;

Thence S. 60° 32' 10" E. a distance of 217.00 feet;

Thence S. 64° 28' 46" E. a distance of 480.71feet;

Thence N. 89° 13' 53" E. a distance of 1,120.88 feet;

Thence N. 88° 35' 06" E. a distance of 761.34 feet;

Thence N. 89° 43' 07" E. a distance of 14.75 feet to a point on the latitudinal section line common to said sections 9 and 10, said point bears S. 00° 12' 35" E. a distance of 1676.78 feet from the Northwest section corner of said section 10;

Thence N. 89° 43' 07" E. a distance of 456.37 feet;

Thence N. 89° 15' 31" E. a distance of 938.35 feet;

Thence S. 71° 08' 00" E. a distance of 21.14 feet;

Thence S. 70° 03' 16" E. a distance of 262.57 feet to a point on the boundary line of said lands of Francis G. Tracy, Jr. Credit Trust and the lands of the City of Carlsbad, filed in Book 155, Page 97;

Thence S. 00° 16' 01" E. along said boundaries a distance of 31.97 feet;

Thence N. 70° 03' 16" W. within said lands of Francis G. Tracy, Jr. Credit Trust a distance of 288.22 feet;

Thence S. 89° 15' 31" W. a distance of 934.00 feet;

Utility Easement Within the Lands of Francis G. Tracy, III, Charles G. Tracy, and the Josephine Eddy Trust

Thence S. 89° 43' 07" W. a distance of 470.74 feet to a point on the latitudinal section line common to said sections 9 and 10, said point bears S. 00° 12' 35" E a distance of 1706.78 feet from the NE corner of said section 9;

Thence S. 89° 43' 07" W. a distance of 14.71 feet;

Thence S. 88° 35' 06" W. a distance of 760.51 feet;

Thence S. 89° 13' 53" W. a distance of 1128.19 feet;

Thence N. 64° 28' 46" W. a distance of 488.75 feet;

Thence N. 60° 32' 10" W. a distance of 216.28 feet;

Thence N. 67° 11' 50" W. a distance of 122.74 feet to a point on the latitudinal quarter section line of said section 9;

Thence N. 67° 11' 50" W. a distance of 33.14 feet;

Thence S 89° 58' 17" W. a distance of 2613.50 feet to a point on the boundary line of said Lot Q of the Riverside Farms Subdivision, also known as the boundary line of said lands of Elaine Mead Murphy and Francis G. Tracy, Jr. Credit Trust;

Thence N 00° 19' 57" W. along said lands of Elaine Mead Murphy and said adjoining lands of Francis G. Tracy, Jr. Credit Trust a distance of 12.67 feet to the said North East Corner of Lot Q of the Riverside Farms Subdivision and place of beginning.

Containing 4.116 acres, more or less.

I, Edward P. Moore, New Mexico Professional Surveyor, Hereby certify that this Easement was prepared from an actual ground survey performed by me or under my supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this Easement Survey and the field survey upon which it is based meet the Minimum Standards for Surveying in New Mexico Subdivision act.

Edward P. Moore

Edward P. Moore N.M.P.S. # 6543
8338A Comanche Blvd. NE
Albuquerque, New Mexico 87110

12-05-01
Date

EXHIBIT "D"

Temporary Construction Easement Within the Lands of Francis G. Tracy, III, Charles G. Tracy, and the Josephine Eddy Trust

A Temporary Construction easement for the City of Carlsbad, being a strip of land being 50.00 feet wide, of which the northerly line of said 50.00 feet wide easement lies 15.00 feet to the right of parallel with and adjacent to the following described centerline starting at P.O.T. station 61+95.10 to P.O.T. station 96+72.86 lying and being situate within Section 9, T.22S. , R.27 E., N.M.P.M., County of Eddy State of New Mexico and being more particularly described as follows to wit:

Beginning at the NE Corner of Lot Q of the Riverside Farms Subdivision also Known as the NW corner of the S1/2, NW1/4, Section 9 T. 22S. , R. 27 E., N.M.P.M., deed to Francis G. Tracy, Jr. Credit Trust, filed in the office of the Eddy of the Eddy Clerk, in Deed Book of Records 363, page 805, being the True Point and Place of beginning and from whence the NW corner of said Section 9 being a ¾ inch iron pipe bears N 00°19'57"W a distance of 1328.28 feet;

Thence N 89°45'11"E along the boundary of said lands of Francis G. Tracy, Jr. Credit Trust and the Lands of Elaine Mead Murphy, filed in Book 244, Page 212, a distance of 2636.95 feet;

Thence S 67°11'50"E a distance of 7.65 feet to a point on the latitudinal quarter section line of said Section 9;

Thence S 67°11'50"E a distance of 137.26 feet;

Thence S 60°32'10"E a distance of 217.00 feet;

Thence S 64°28'46"E a distance of 480.71 feet to P.O.T. station 96+72.86.

Containing 3.533 acres, more or less.

I, Edward P. Moore, New Mexico Professional Surveyor, Hereby certify that this Temporary Construction Easement was prepared by me from an actual ground survey performed by me or under my supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this Easement Survey and field survey upon which its is based meet the Minimum Standards for Surveying in New Mexico Subdivision act.

Edward P. Moore

Edward P. Moore N.M.P.S. #6543
8338A Comanche Blvd. NE
Albuquerque, New Mexico 87110

12-05-01
Date

Temporary Construction Easement Within the Lands of Francis G. Tracy, III, Charles G. Tracy, and the Josephine Eddy Trust

A Temporary Construction easement for the City of Carlsbad, being a strip of land being 50.00 feet wide, of which the southerly line of said 50.00 feet wide easement lies 15.00 feet to the left of parallel with and adjacent to the following described centerline starting at P.O.T. station 96+72.86 to P.O.T. station 132+51.75 lying and being situate within Section 9, and Section 10 T.22S.,R.27 E., N.M.P.M., County of Eddy State of New Mexico and being more particularly described as follows to wit:

Beginning at P.O.T. Station 96+72.86 as said same is shown on sheet 3 of 4 of City of Carlsbad Utility Easement,

Thence N 89°13'53"E a distance of 1,120.88 feet;

Thence N 88°35"06"E a distance of 761.34 feet;

Thence N 89°43'07"E a distance of 14.75 feet to a point on the latitudinal section line common to said Sections 9 and 10, said point bears S 00°12'35"E a distance of 1676.78 feet from the Northwest section corner of said section 10:

Thence N89°43'07"E a distance of 456.37 feet;

Thence N89°15'31"E a distance of 461.01 feet to a point at station 124+90.55, at which point, the strip of land being 50.00 wide, of which the northerly 50.00 feet wide easement lies 15 feet to the right of parallel with and adjacent with the following described centerline;

Thence N89°15'31"E a distance of 493.27 feet;

Thence S70°03'16"E a distance of 386.35 feet to station 132+51.75 and from whence the NE corner of said section 10 bears N64°19'02"E a distance of 3995.82 feet.

Containing 4.108 acres, more or less.

I, Edward P. Moore, New Mexico Professional Surveyor, Hereby certify that this Temporary Construction Easement was prepared by me from an actual ground survey performed by me or under my supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this Easement Survey and field survey upon which its is based meet the Minimum Standards for Surveying in New Mexico Subdivision act.

Edward P. Moore

12-05-01
Date

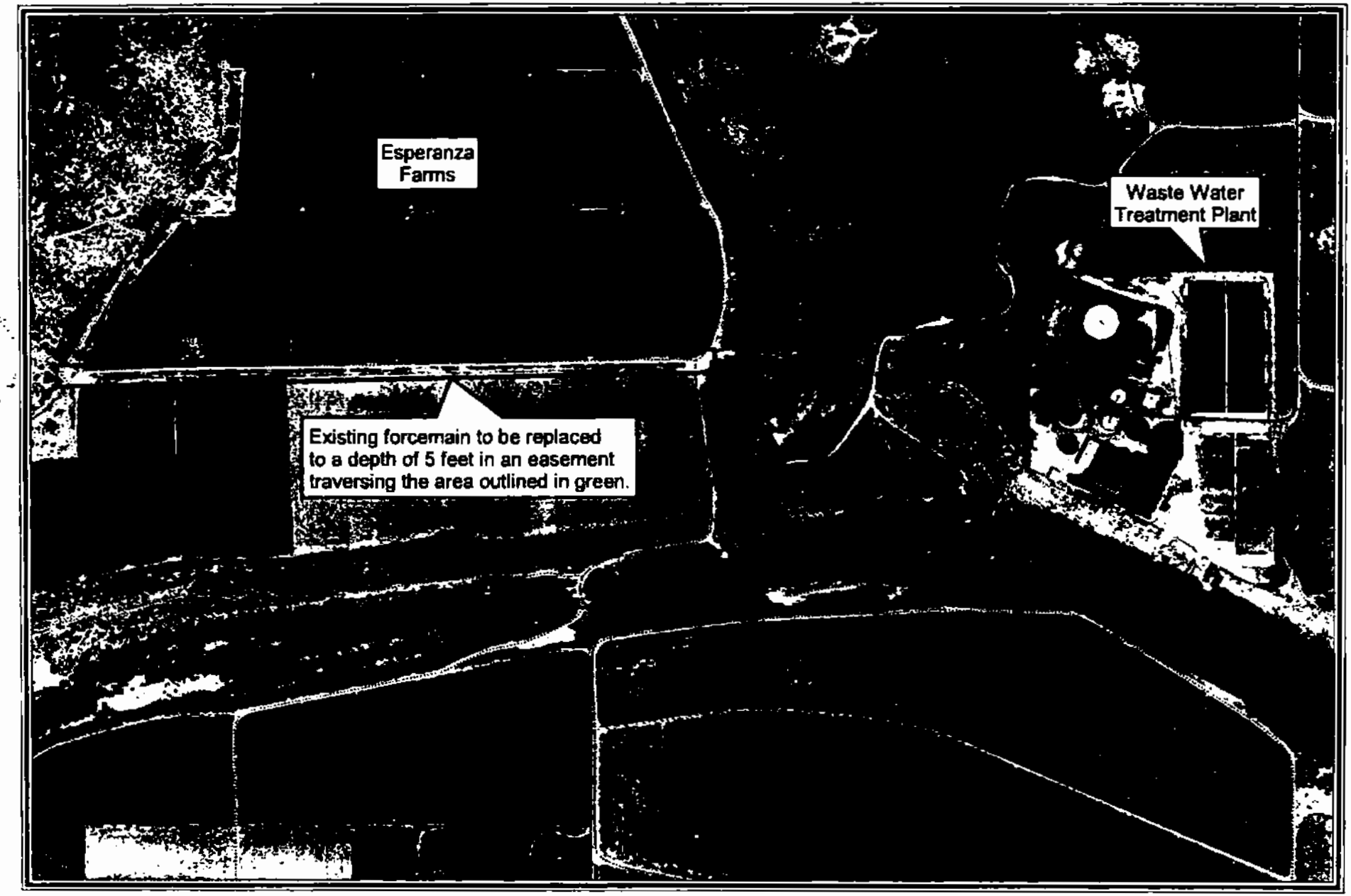
Edward P. Moore N.M.P.S. #6543
8338A Comanche Blvd. NE
Albuquerque, New Mexico 87110

EDWARD P. MOORE
NEW MEXICO
6543
REGISTERED LAND SURVEYOR

EXHIBIT F
Existing Forcemain Relocation

500 0 500 1000 1500 2000 Feet

CITY OF CARLSBAD
Engineering Department
08/30/04



y19
C: Mead, JRT, RC
LC, Invest., Diane D.
Contract, Deed, Anna B.
Greg H.
O: Vault

E-131

GRANT OF PIPELINE EASEMENT

Elaine Mead Murphy, also known as Elaine Campbell Mead Murphy, a married woman dealing in her sole and separate property (hereinafter "GRANTOR"), for and in the consideration of the CITY's performance of the terms and conditions contained in the Agreement attached hereto as Exhibit "A," the completion and sufficiency of such consideration being acknowledged and confessed, does hereby grant, sell, and convey unto the City of Carlsbad, Eddy County, New Mexico, a municipal corporation whose address is P.O. Box 1569, Carlsbad, NM 88221-1569 and its successors and assigns (referred to herein as "CITY"), a right-of-way and easement herein described upon the following terms and conditions:

1. GRANTOR hereby grants, sells, and conveys unto the CITY a right-of-way and easement in, under, on, over, upon, across, and through a strip of land thirty feet (30') in width described as follows:

> See attached Exhibit "C," the Utility Easement legal description, and Exhibit "B," the City of Carlsbad Utility Easement plat and description

for the purpose of surveying, installing, constructing, laying, reconstructing, relaying, using, operating, maintaining, inspecting, repairing, replacing, controlling, and removing two pipelines, together with the conduct of any necessarily connected work, including, but not limited to the CITY's and its agents' use of the easement as a right-of-way for the purpose of surveying, installing, constructing, laying, reconstructing, relaying, using, operating, maintaining, inspecting, repairing, replacing, controlling, or removing the pipelines. The pipelines shall be used solely for the conveyance of sewage and/or treated effluent.

2. During temporary periods, GRANTOR hereby further grants, sells, and conveys unto the CITY an additional fifty foot (50') wide right-of-way and easement in, under, on, over, upon, across, and through a strip of land along and adjacent to said thirty feet and further described as follows:

> See attached Exhibit "D," the Temporary Construction Easement legal descriptions, and Exhibit "B," the City of Carlsbad Utility Easement plat and description

for the purpose of surveying, installing, constructing, laying, reconstructing, relaying, maintaining, inspecting, repairing, replacing, controlling, or removing the pipelines.

3. This right-of-way and easement shall carry with it the right of ingress and egress to and from, and access on and along said right-of-way, with the right to use existing roads, for the purpose of surveying, installing, constructing, laying, reconstructing, relaying, using, operating, maintaining, inspecting, repairing, replacing, controlling, and removing the pipelines, together with the conduct of any necessarily connected work. The CITY shall not pave, install a road, or place surfacing materials on any part of the right-of-way and easement. The CITY agrees that it will not open a public roadway upon the land covered by the easement.

City of Carlsbad
Eileen R.OR...
PO Box 1569
Carlsbad NM
88221-1569

4. GRANTOR represents and warrants that the GRANTOR is the owner in fee simple of the surface estate of this right-of-way and easement subject to oil and gas leases and other encumbrances, if any of record. This right-of-way and easement is made subject to all restrictions, easements, covenants, conditions, mineral interests, mineral leases, and other matters or encumbrances of record affecting the right-of-way and easement area as described herein as shown in the applicable real estate records of Eddy County, New Mexico.

5. GRANTOR reserves the right of ingress and egress at any and all times for the purpose of prospecting for, mining, and removing oil, gas, potash, and other minerals in, under, and that may be produced from the lands described in Exhibits "C" and "D." GRANTOR's use of the easement shall not be exercised to the detriment of the CITY or otherwise interfere with the CITY's right to use the easement as granted herein.

6. GRANTOR retains the right to permit vehicular and pedestrian traffic across the right-of-way and easement. GRANTOR may, at any time and as desired by GRANTOR, pave or place surfacing materials on any part of the right-of-way and easement for the limited purpose of constructing a roadway that crosses the right-of-way and easement at a perpendicular angle. GRANTOR shall notify the CITY in writing of GRANTOR's intent to construct a roadway sixty (60) days in advance of any construction. GRANTOR's use of the easement shall not be exercised to the detriment of the CITY or otherwise interfere with the CITY's right to use the easement as granted herein.

7. GRANTOR retains the right to construct any irrigation ditches or canals needed or used or to be used by GRANTOR for the irrigation of lands owned by GRANTOR now or in the future. GRANTOR's use of the easement shall not be exercised to the detriment of the CITY or otherwise interfere with the CITY's right to use the easement as granted herein.

8. The CITY agrees that any new pipeline constructed by it upon the easement shall be buried to a minimum depth of five feet (5') from the top of the pipeline to grade. The existing pipeline may remain as it is currently placed.

9. Any pipeline constructed, laid, or relaid upon the easement shall be a continuous line without risers, pumping stations, or manholes at any point upon the easement. The pipelines shall be permitted to have air vacuum valves upon the easement.

10. The CITY shall take such steps as may be reasonably necessary from time to time to protect and restore the right-of-way and easement from erosion damage resulting from the CITY's exercise of its rights hereunder. The CITY shall pay any reasonable damages which may arise to crops, pasturage or fences of GRANTOR arising from CITY's exercise of the rights granted herein.

11. CITY shall use reasonable diligence to prevent its employees, contractors, or subcontractors from bringing firearms on the right-of-way and easement.

12. Should the CITY vacate or abandon the easement or cease to use the easement for the purposes specified in this document, the easement shall terminate.

13. Upon termination of the easement, the CITY shall remove its pipelines from the easement and shall reseed with appropriate native grass seed mixture or reclaim those undeveloped or nonagricultural areas disturbed by the removal of the pipelines.

14. The CITY agrees that it shall indemnify and hold GRANTOR harmless from any claim, demand, or action for which the CITY would be legally liable that may arise from the negligent action or inaction of the CITY with regards to its surveying, installing, constructing, laying, reconstructing, relaying, maintaining, inspecting, repairing, replacing, controlling, or removing the pipelines. The CITY and its public employees, as defined by the New Mexico Tort Claims Act, do not waive any sovereign immunity, any defense, and/or any limitation of liability pursuant to law. No provision of this Easement modifies and/or waives any provision of the New Mexico Tort Claims Act.

15. All rights, title, and privileges herein granted, including all benefits and burdens, shall run with the land and shall be binding upon and inure to the benefit of the parties, and their respective heirs, executors, administrators, successors, assigns, and legal representatives.

IN WITNESS WHEREOF, the GRANTOR has executed these presents this 10th day of November, 2004.

Elaine Mead Murphy
ELAINE MEAD MURPHY

STATE OF NEW MEXICO)
)ss
COUNTY OF EDDY)

The foregoing instrument was signed and acknowledged before me this 10th day of November, 2004, by ELAINE MEAD MURPHY, also known as Elaine Campbell Mead Murphy.

My Commission Expires:

Jan. 22, 2005

Notary Public

NOTARY PUBLIC STATE OF NEW MEXICO

EXHIBIT "A"

Consideration for Grant of Pipeline Easement

THIS AGREEMENT is entered into at Carlsbad, New Mexico, this 10th day of November, 2004, by and between the **CITY OF CARLSBAD**, New Mexico, a municipal corporation, hereinafter referred to as "**CITY**," and **ELAINE MEAD MURPHY**, also known as Elaine Campbell Mead Murphy, a married woman dealing in her sole and separate property, hereinafter referred to as "GRANTOR."

In and for the consideration of the CITY's performance of the terms and conditions contained herein, the completion and sufficiency of such consideration being acknowledged and confessed, GRANTOR does hereby grant, sell, and convey unto the City of Carlsbad, Eddy County, New Mexico, a municipal corporation whose address is P.O. Box 1569, Carlsbad, NM 88221-1569 and its successors and assigns (hereinafter "CITY"), easements as described in the Grant of Pipeline Easement to which this Agreement is attached.

The CITY or its agents shall:

1. Mark with survey monuments GRANTOR's property corners along the east-west property line in the NW1/4 of Section 9, T22S, R27E, N.M.P.M.

2. Construct fences along the following property boundaries of GRANTOR:
   - A. Along the west property line of GRANTOR's property abutting the alley east of the miners' parking lot on Interstate Highway 62/180 (the Hobbs Highway) and abutting the CITY park commonly known as Sun Country Youth Park to Wildcat Bluff, a distance of approximately one thousand three hundred nineteen feet (1319');
   - B. Along the east bank of the Pecos River, across Section 8, T22S, R27E, a distance of approximately four thousand one hundred thirty-one feet (4,131'), with the location of such fence to be archeologically surveyed; and
   - C. Along the property boundary between the GRANTOR's property and the property owned by Francis G. Tracy, III, Charles G. Tracy, and the Josephine Eddy Trust:
     - i. Parallel to the section line between Sections 8 and 9, T22S, R27E, a distance of approximately one thousand three hundred twenty-eight feet (1,328'), with such fence to be placed on the Tracy/Eddy property approximately ten feet (10') from the boundary with GRANTOR's property; and
     - ii. Parallel to the east-west half line of the NW1/4 of Section 9, T22S, R27E, a distance of approximately two thousand six hundred forty-four feet (2,644'), with such fence to be placed on the south edge of the permanent easement.

3. The fences shall be:
   A. four-strand barbed wire with steel "T" posts drilled or driven in the ground every twelve feet (12');
   B. with two (2) twist stays between posts;
   C. "H" braces and corners made of three inch (3") steel pipe set in concrete; and
   D. with gates made of steel pipe tubing as specified by the New Mexico State Highway Department.

4. Post "No Trespassing" signs at every gate and every five hundred feet (500') for the fences described in Paragraphs 2(A) and 2(B).

5. Have an archeological survey conducted regarding the Easement. Any archeological sites so located shall be protected during construction of the pipeline.

6. Place boulders across the three points in Section 8, T22S, R27E, N.M.P.M. used as low water crossings of the Pecos River with such boulders to be placed on west side of the river on CITY property.

7. Remove an old car body from GRANTOR's property near the area commonly known as Wildcat Bluff.

8. Remove and dispose of the excavation debris left on the surface of GRANTOR's property. That being the debris which was created during the placement of the existing pipeline in 1962.

9. The CITY shall reseed or reclaim those undeveloped or nonagricultural areas disturbed by the activities of the City described in this Agreement and in the Grant of Easement. Reseeding shall be done with appropriate native grass seed mixture.

CITY OF CARLSBAD:

BOB FORREST, MAYOR

ATTEST:

PEARLENE BRADSHAW, CITY CLERK

GRANTOR:

Elaine Mead Murphy
ELAINE MEAD MURPHY

STATE OF NEW MEXICO)
)ss
COUNTY OF EDDY)

The foregoing instrument was signed and acknowledged before me this 10th day of November, 2004, by ELAINE MEAD MURPHY, also known as Elaine Campbell Mead Murphy.

My Commission Expires:

Jun. 22, 2005

Annette Bennick
Notary Public

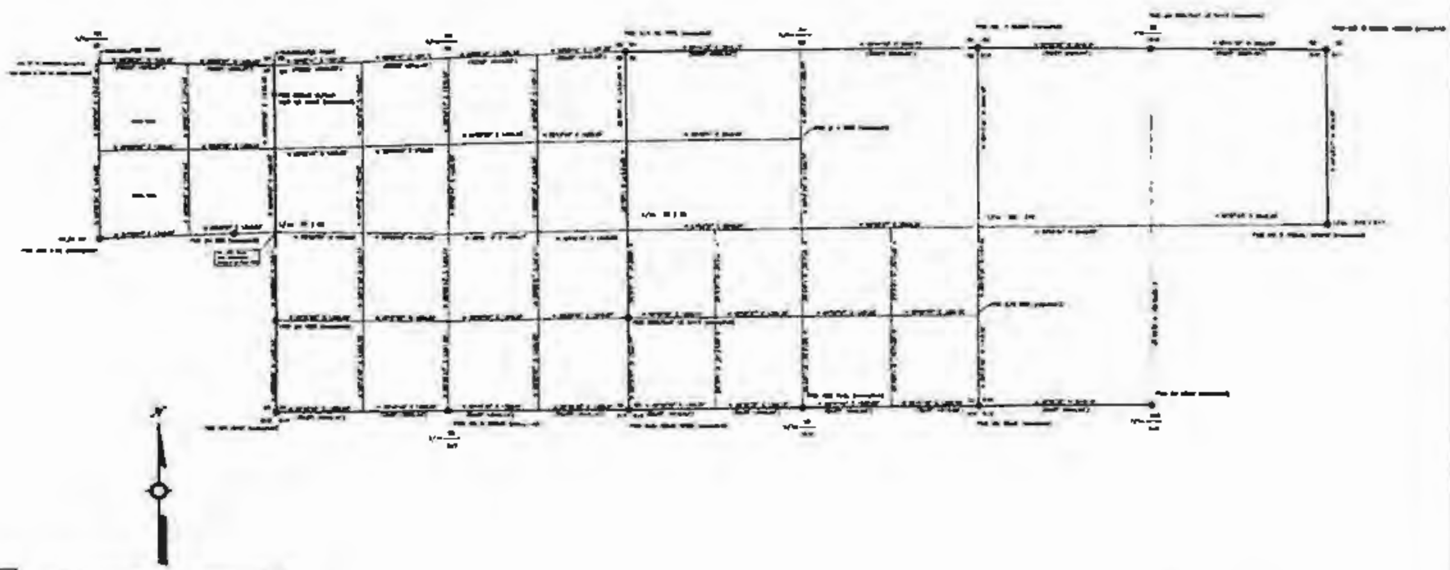
CITY OF CARLSBAD UTILITY EASEMENT

Within S7, S8, S9, S10, T22S, R27E, N.M.P.M.

CARLSBAD — EDDY COUNTY — NEW MEXICO

MAY, 2000

PROPERTY CONTROL MAP



SCALE: 1 Inch = 1000 Feet

EXHIBIT "B"

PWT
PACIFIC WESTERN TECHNOLOGIES, LTD.

PHILIP W. TURNER
NEW MEXICO

11-2-01

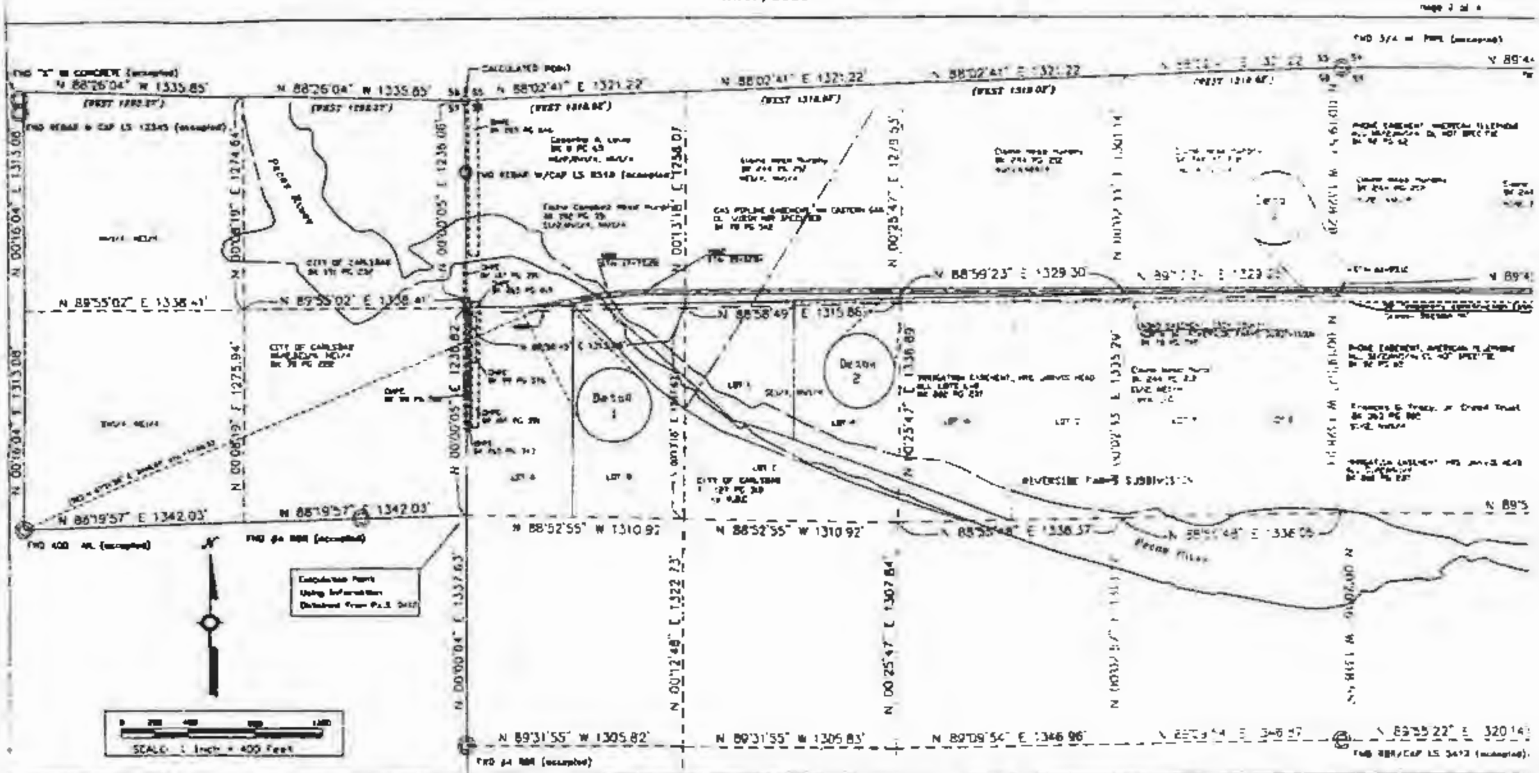
CITY OF CARLSBAD UTILITY EASEMENT

Within S7, S8, S9, S10, T22S, R27E, N.M.P.M.

CARLSBAD ———— EDDY COUNTY ———— NEW MEXICO

MAY, 2000

EXHIBIT "B"



NOTE
1. ALL DISTANCES ARE GROUND DISTANCES
2. ALL BEARINGS ARE GRID BEARINGS
3. COORDINATE SYSTEM IS NEW MEXICO STATE PLANE NAD 83 EAST
4. GROUND TO GRID FACTOR EQUALS 0.99977
5. CARLSBAD [illegible] STATION USED AS POINT OF ORIGIN FOR GRID VALUES
6. DENOTES RECORD VALUES [illegible]
7. DENOTES MEASURED VALUES [illegible]
8. DENOTES FOUND AND ACCEPTED [illegible] MONUMENTS
9. DENOTES CENTER LINE OF EASEMENT
10. UTILITY EASEMENT IS 30 FEET WIDE.
11. CENTER LINE OF OLD SEWER PIPE IS APPROX. 3 FEET FROM THE NORTHERLY EASEMENT BOUNDARY, AND APPROX. 27 FEET FROM THE SOUTHERLY EASEMENT BOUNDARY
12. TEMPORARY CONSTRUCTION EASEMENT IS FIFTY FEET WIDE
13. DURATION OF TEMPORARY CONSTRUCTION EASEMENT IS ONE YEAR (365 DAYS) COMMENCING ON THE FIRST DAY OF CONSTRUCTION

NAD 83 SPC GRID, NM East		
SCALE FACTOR 0.99977		
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PT #	BEARING	DISTANCE	PT #
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[illegible]	[illegible]	[illegible]	[illegible]

I, Philip W. Turner, New Mexico Professional Surveyor, hereby certify that this Easement Survey Plat was prepared from an actual ground survey performed by me or under my supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this Easement Survey Plat and the field survey upon which it is based meet the Minimum Standards for Surveying in New Mexico, and that this survey is not a land division or subdivision as defined in the New Mexico Subdivision Act.

Philip W. Turner, N.M.P.S. # 10204 — 11-02-01 Date

PWT PACIFIC WESTERN TECHNOLOGIES, LTD.

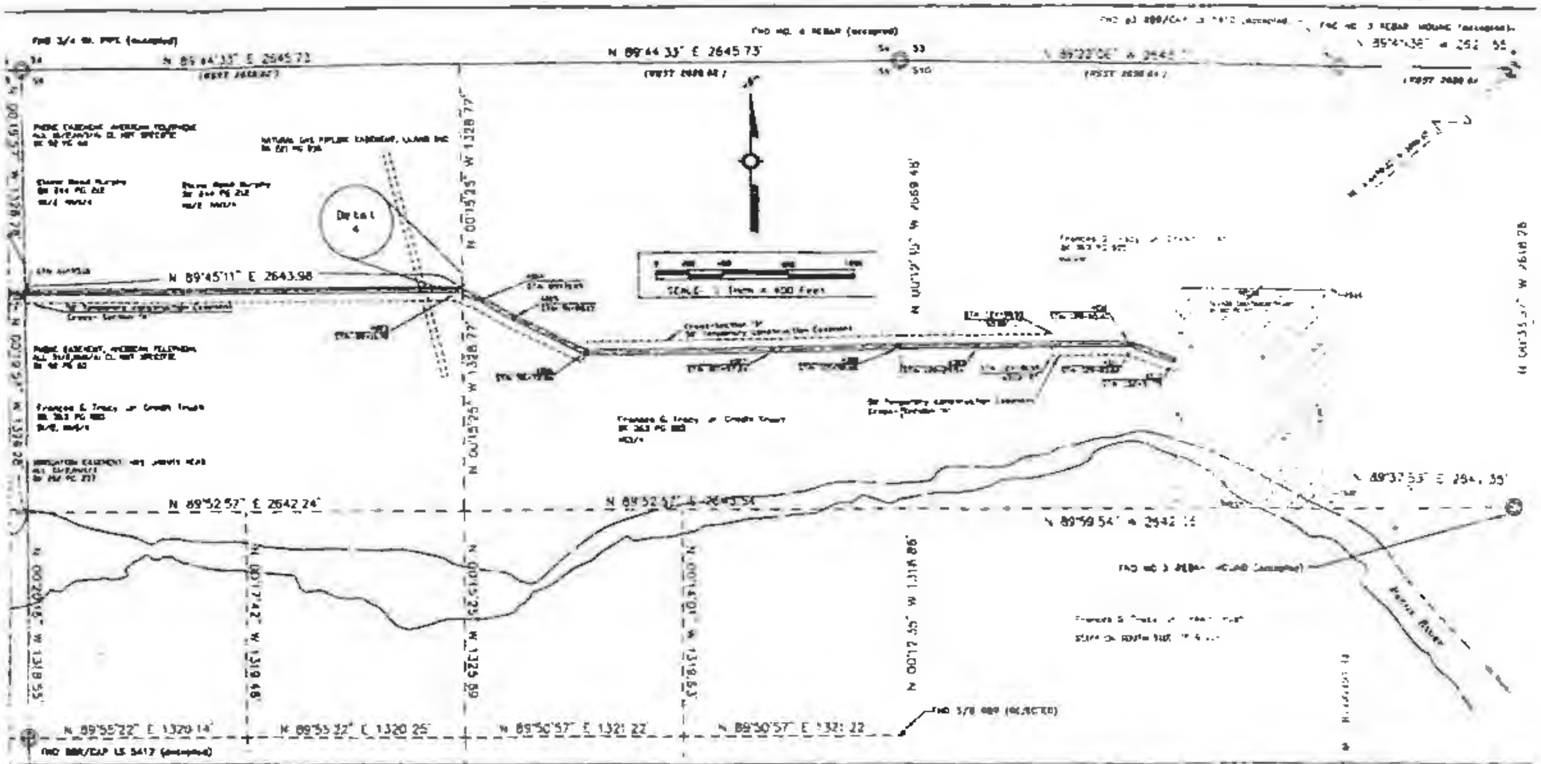
CITY OF CARLSBAD UTILITY EASEMENT

Within S7, S8, S9, S10, T22S, R27E, N.M.P.M.

CARLSBAD — EDDY COUNTY — NEW MEXICO

MAY, 2000

EXHIBIT "B"



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SCALE FACTOR [illegible]		
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PT #	BEARING	DISTANCE	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]

PWT PACIFIC WESTERN TECHNOLOGIES, LTD.

11-2-01

CITY OF CARLSBAD UTILITY EASEMENT

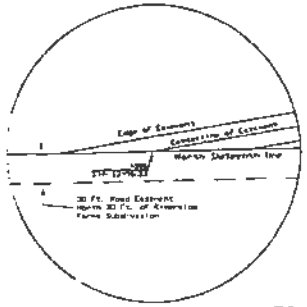
Within S7, S8, S9, S10, T22S, R27E, N.M.P.M.

CARLSBAD — EDDY COUNTY — NEW MEXICO

MAY, 2000

EXHIBIT "E"
Page 4 of

Detail 1



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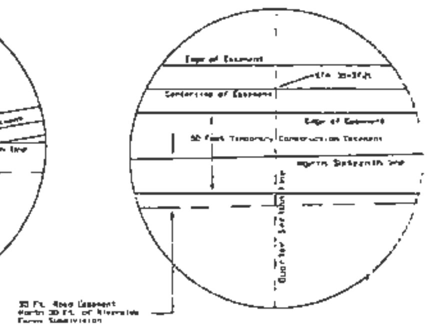
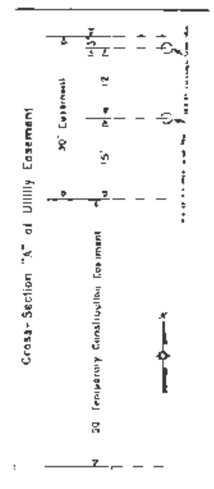
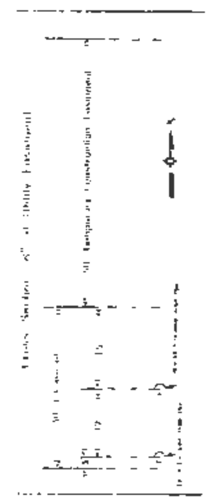


NOTE:
DETAILS NOT TO SCALE





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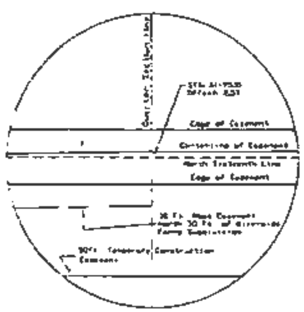

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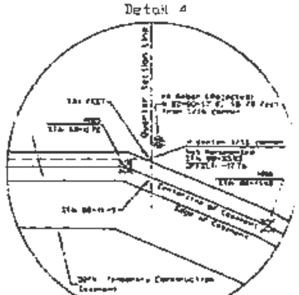

PACIFIC WESTERN TECHNOLOGIES, LTD.

I, Philip W. Turner, New Mexico Professional Surveyor, hereby certify that this Easement Survey Plat was prepared from an actual ground survey performed by me or under my supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this Easement Survey Plat and the field survey upon which it is based meet the Minimum Standards for Surveying in New Mexico, and that this survey is not a land division or subdivision as defined in the New Mexico Subdivision Act.

Philip W. Turner NMPS # 10204 — 11-2-01
Date

NOTE
1. ALL DISTANCES ARE GROUND DISTANCES
2. ALL BEARINGS ARE GRID BEARINGS
3. COORDINATE SYSTEM IS NEW MEXICO STATE PLANE NAD 83 EAST
4. GROUND TO GRID FACTOR EQUALS 0.999772104650
5. CARLSBAD HARN STATION USED AS POINT OF ORIGIN FOR GRID VALUES
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11. CENTER LINE OF OLD SEWER PIPE IS APPROX. 3 FEET FROM THE NORTHERLY EASEMENT BOUNDARY AND APPROX. 27 FEET FROM THE SOUTHERLY EASEMENT BOUNDARY
12. TEMPORARY CONSTRUCTION EASEMENT IS FIFTY FEET WIDE
13. DURATION OF TEMPORARY CONSTRUCTION EASEMENT IS ONE YEAR (365 DAYS) COMMENCING ON THE FIRST DAY OF CONSTRUCTION

RECEIVED INFORMATION FOR COUNTY CLERK

FILED AND RECORDED

Utility Easement Within the Lands of Elaine Mead Murphy
A.KA. Elaine Campbell Mead Murphy

A utility right-of-way easement for the City of Carlsbad, being that part of a strip of land being 30.00 feet wide from P.O.T. Station 13+96.33 to P.O.T. Station 88+27.45, lying and being situated within Sections 7,8,9, T.22 S., R.27 E., N.M.P.M, and being more particularly described as follows:

Beginning at a point on the boundary of the lands of Elaine Campbell Mead Murphy, S1/2, NW1/4,NW1/4, S8, T.22 S., R.27 E., N.M.P.M., County of Eddy, State of New Mexico, filed in the office of Eddy County Clerk, Deed Book of Records 192, Page 35, Centerline P.O.T. Station 13+95.33, said point bears S 67° 21' 58" W a distance of 3445.07 feet from center quarter corner of said section 7;

Thence S 88° 58' 49" W, 98.62 feet along the boundary of the lands of the City of Carlsbad, filed in Book 127, Page 318, and the said lands of Elaine Campbell Mead Murphy;

Thence N 80° 13' 55" E a distance of 477.08 feet;

Thence N 86° 08' 24" E a distance of 229.02 feet;

Thence N 89° 58' 17" E a distance of 219.09 feet to a point on the boundary of said lands of Elaine Campbell Mead Murphy, and adjoining lands of Elaine Mead Murphy, filed in Book 244, Page 212;

Thence N 89° 58" 17" E a distance of 3973.53 feet to a point on the section line common to said sections 8 and 9, said point bears S 00° 19' 57" E a distance of 1310.95 feet from the Northwest corner of said section 9 being a ¾ inch pipe;

Thence N 89° 58" 17" E a distance of 2619.71feet;

Thence S.67° 11" 50" E a distance of 18.78 feet to Station 88+33.93 and a point on the Boundary line of said lands of Elaine Mead Murphy and the lands of Francis G. Tracy, Jr. Credit Trust, filed in Book 363, Page 305, said point bears S 00°15'25"E a distance of 1328.77 feet from the N1/4 corner of Section 9 T.22 S.,R27E.;

Thence S 89° 45" 11" W a distance of 2,636.95 feet along the boundary of said lands of Elaine Mead Murphy and said lands of Francis G. Tracy, Jr. Credit Trust, to the North East Corner of Lot Q of the Riverside Farms Subdivision, being on the section line common to said sections 8 and 9, said point bears S 00° 19' 57" E a distance of 1328.28 feet from the Northeast corner of said section 8 being a ¾ inch pipe;

Thence S 89° 13' 34" W a distance of 974.12 feet;

Thence S 89° 58' 17" W a distance of 2999.71 feet to a point on the boundary line of said lands of Elaine Campbell Mead Murphy, and said lands of Elaine Mead Murphy;

Thence S 89° 58' 17" W a distance of 218.08 feet;

Thence S 86° 08' 24"W a distance of 225.59 feet;

Thence S 80° 13' 55" W a distance of 280.82 feet. to a point on the boundary of said lands of Elaine Campbell Mead Murphy and said lands of The City of Carlsbad;

EXHIBIT "C"

Utility Easement Within the Lands of Elaine Mead Murphy A.K.A. Elaine Campbell Mead Murphy

Thence S 88° 29' 08" W a distance of 98.62 feet along the said lands of Elaine Campbell Mead Murphy and the City of Carlsbad to a point and place of beginning.

Containing 3.907 acres, more or less.

I, Edward P. Moore, New Mexico Professional Surveyor, Hereby certify that this Easement was prepared from an actual ground survey performed by me or under my supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this Easement Survey and the field survey upon which it is based meet the Minimum Standards for Surveying in New Mexico Subdivision act.

Edward P. Moore

Edward P. Moore N.M.P.S. # 6543
8338A Comanche Blvd. NE
Albuquerque, New Mexico 87110

12-05-01
Date

EDWARD P. MOORE
NEW MEXICO
6543
REGISTERED LAND SURVEYOR

Temporary Construction Easement Within the Lands of Elaine Mead Murphy A.K.A Elaine Campbell Mead Murphy

A Temporary Construction easement for the City of Carlsbad, being a strip of land being 50.00 feet wide, of which the northerly line of said 50.00 feet wide easement lies 30.00 feet to the right of parallel with and adjacent to the following described centerline starting at P.O.T. station 13+96.33 to P.O.T. station 61+95.10 lying and being situate within Section 8, T.22S.,R.27 E., N.M.P.M., County of Eddy State of New Mexico and being more particularly described as follows to wit:

Beginning at a point on the boundary of the lands of Elaine Campbell Mead Murphy, S1/2,NW1/4NW1/4 of Section 8 T.22S.,R27 E., N.M.P.M. Count of Eddy, State of New Mexico, as said same is filed in the office of the Eddy County Clerk, in Deed Book of Records 192, Page 35 Centerline P.O.T. station 13+96.33, bears N 67°21'58"E a distance of 3445.07 feet from the center quarter corner of said Section 7;

Thence N 80°13'55"E a distance of 378.95 feet;

Thence N 86°08'24"E a distance of 227.56 feet;

Thence N 89°58"17"E a distance of 229.02 feet to P.O.T. station 22+21.93 being a point on the boundary of said lands of Elaine Campbell Mead Murphy, and adjoining lands of Elaine Mead Murphy, filled in Book 244, Page 212;

Thence N 89°58'17"E a distance of 3973.53 feet to a point on the section line common to said sections 8 and 9, said point bears S 00°19'57"E a distance of 1310.95 feet from a ¾ inch pipe being the Northwest corner of said Section 9 T.22 S.,R.27 E.

Containing 5.520 acres, more or less.

I, Edward P. Moore, New Mexico Professional Surveyor, Hereby certify that this Temporary Construction Easement was prepared by me from an actual ground survey performed by me or under my supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this Easement Survey and field survey upon which its is based meet the Minimum Standards for Surveying in New Mexico Subdivision act.

Edward P. Moore

Edward P. Moore N.M.P.S. #6543
8338A Comanche Blvd. NE
Albuquerque, New Mexico 87110

12-05-01
Date

RECEPTION NO: 0500262 STATE OF NEW MEXICO, COUNTY OF EDDY
RECORDED 01/07/2005 4:43 PM
BOOK 0580 PAGE 0007
JEAN BLENDEN, COUNTY CLERK

SEAL

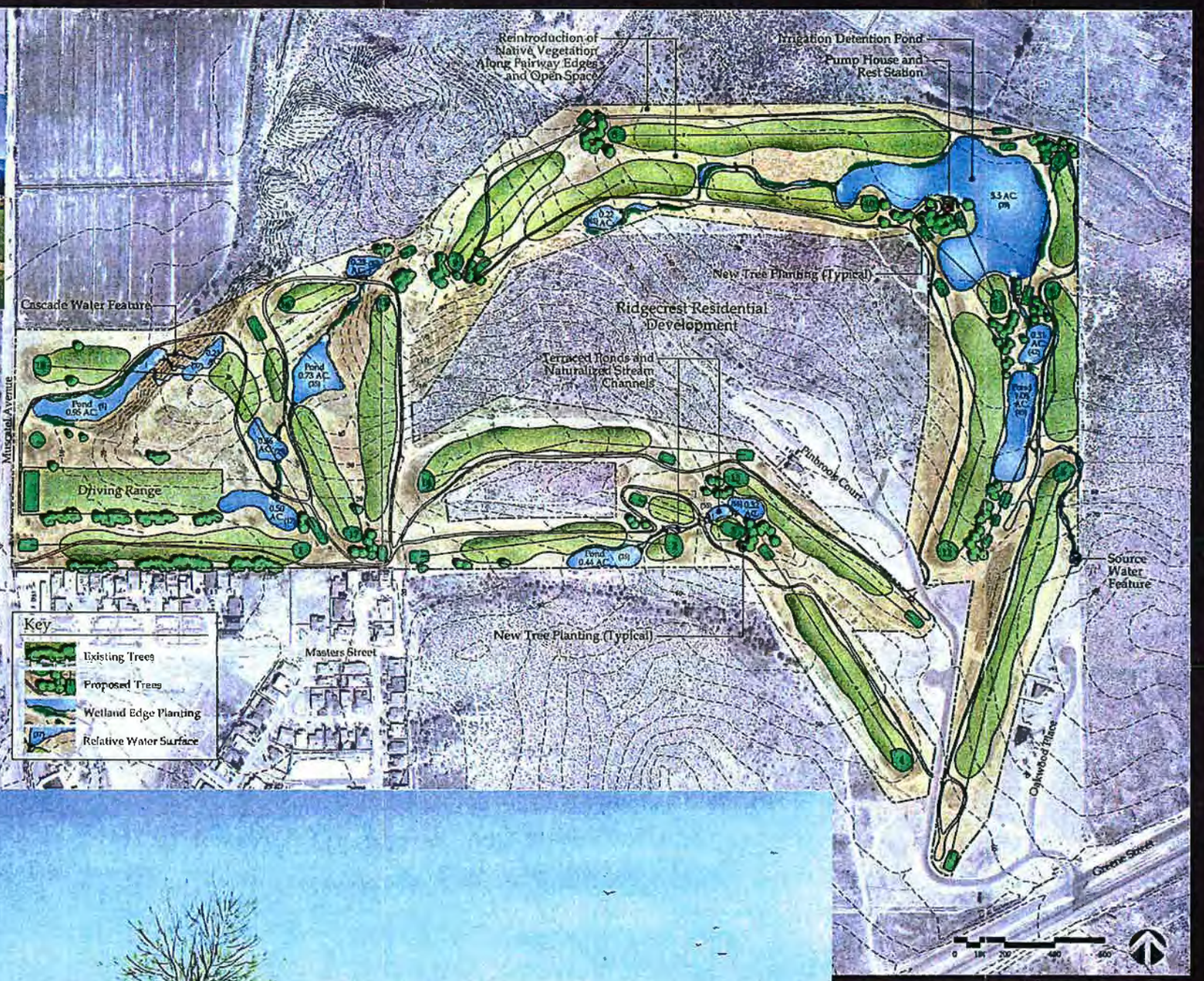
EDWARD P. MOORE
NEW MEXICO
8543
REGISTERED LAND SURVEYOR

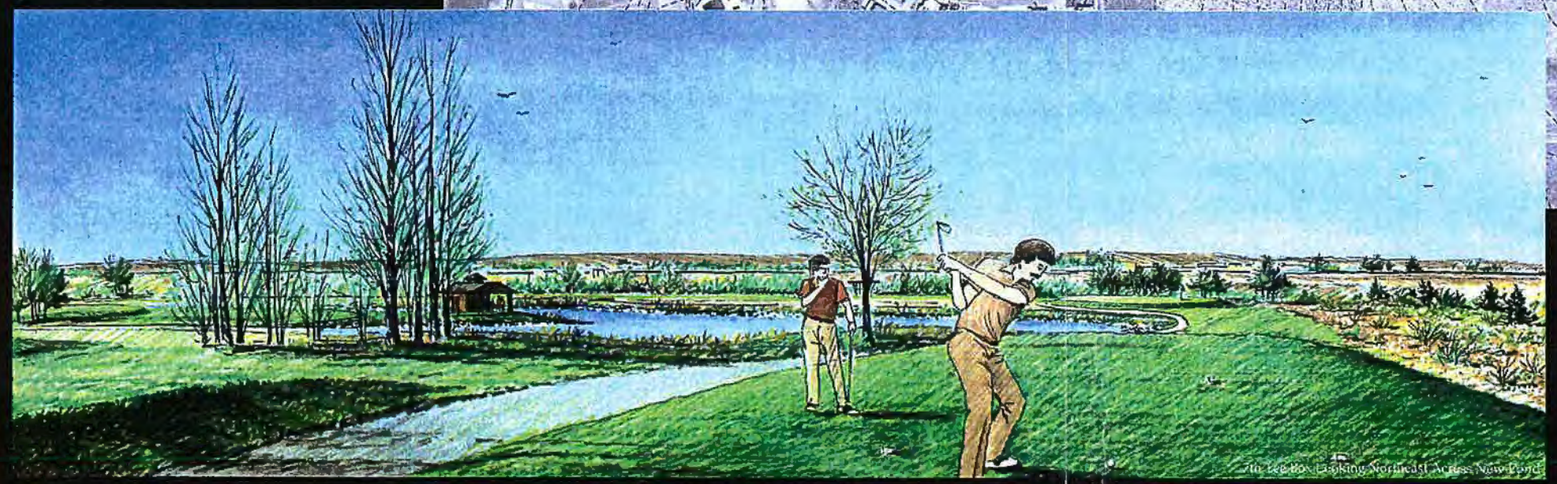
EXHIBIT "D"

Appendix E

Lake Carlsbad Municipal Golf Course Master Plan (Conceptual Drawings Only)

Master Plan





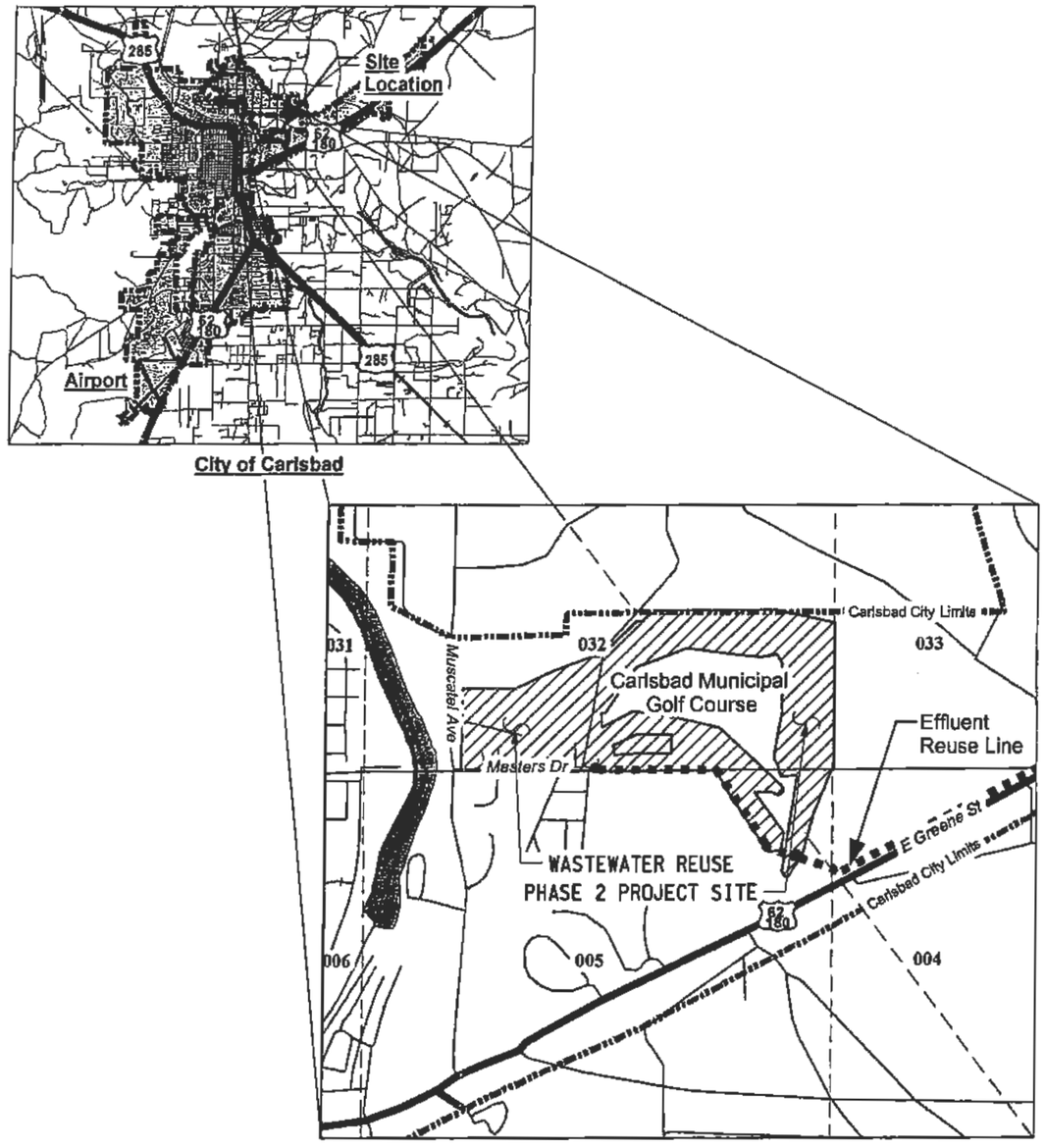
Lake Carlsbad Municipal Golf Course

Waste Water Effluent Reuse Project Phase II

July 23, 2003

Carlsbad, New Mexico

Washington EDAW



12-SK-001

DRAWING INDEX

CIVIL DRAWINGS

12-SK-001	DRAWING INDEX, VICINITY MAP & GENERAL NOTES
12-SK-002	SITE PLAN
12-SK-003	UNDERGROUND UTILITIES PLAN
12-SK-004	PLAN - SHT. 1 OF 4
12-SK-005	PLAN - SHT. 2 OF 4
12-SK-006	PLAN - SHT. 3 OF 4
12-SK-007	PLAN - SHT. 4 OF 4
12-SK-008	BORING LOG - PLAN
12-SK-010	SECTIONS

STRUCTURAL DRAWINGS

12-SK-009	MAIN PUMP STATION - PLAN AND DETAILS

PIPING DRAWINGS

16-SK-001	FLOW DIAGRAM

City of Carlsbad

Site Location

GENERAL NOTES:

1. LAND SURVEY ISSUED BY THE CITY OF CARLSBAD

PRELIMINARY

MICRO	REV NO	DATE	REVISIONS	DSNR	CH'D
	P		ISSUED FOR REVIEW		

REVISION APPROVAL RECORD			REV		
DISCIPLINE	REVIEWED	DATE	DISCIPLINE	REVIEWED	DATE
CIVIL			PIPING		
STRUCTURAL			ELECTRICAL		
HVAC			ARCHITECTURAL		
MECHANICAL			INST & CONTROL		
PROCESS			ENVIRONMENTAL		
NUCLEAR			GEN. ARRANG.		

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CHECKER
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FILE: 12sk001.dgn
UPDATED: 11/15/10 BY: BP

PRINT DISTRIBUTION RECORD
DATE
FOR
REV. NO.
CLIENT
FIELD
INTRA CO.

DRAWING STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY				
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

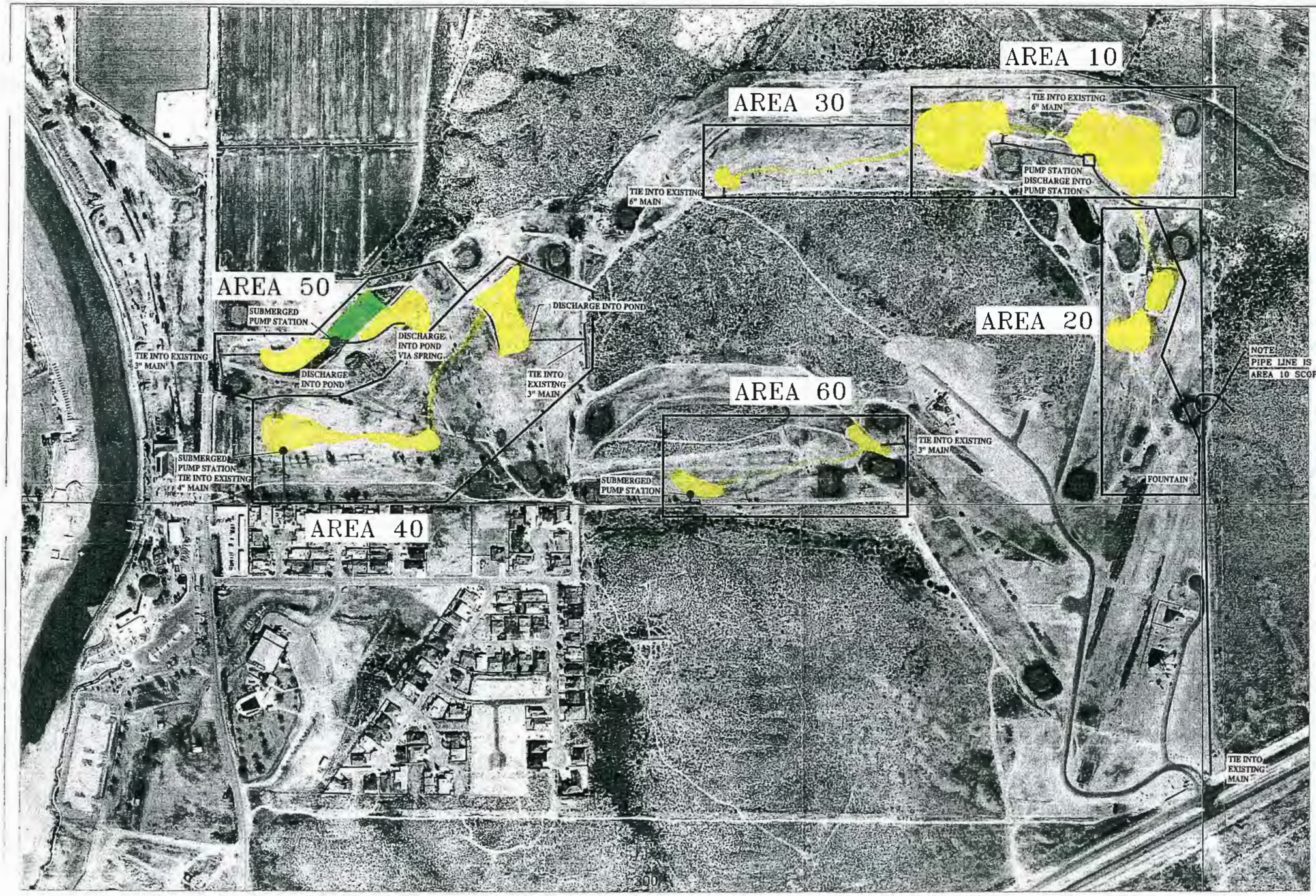
NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO

CIVIL
DRAWING INDEX, VICINITY MAP
AND GENERAL NOTES

SCALE: NTS
WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

Washington

DWG. NO. 12-SK-001
ORDER NO. 26759-001
REV P



LEGEND

- FUTURE PONDS
- FUTURE PIPE
- FUTURE OPEN CHANNELS
- FUTURE FALLS

SITE PLAN LAYOUT

SCALE FEET
0 200' 400'
1" = 200'

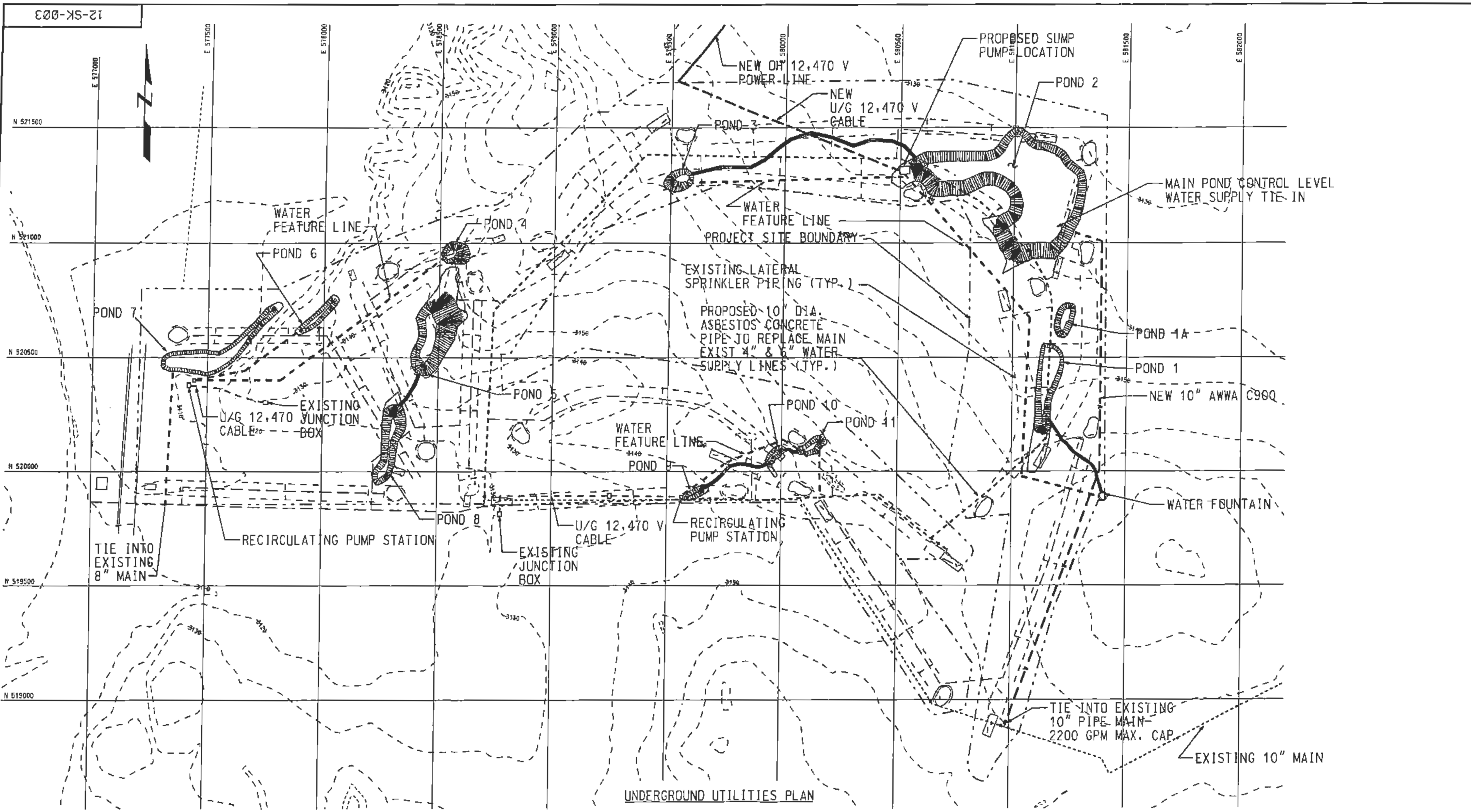
north

Lake City Municipal Golf Course
Waste Water Effluent Reuse Project Phase 2
Carlsbad, New Mexico

CONCEPTUAL SITE PLAN AND SITE FEATURES

CITY OF CARLSBAD

Washington



PRELIMINARY

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REVISIONS: P — FOR REVIEW

DRAWING STATUS: PRELIMINARY / FOR COMMENTS AND/OR APPROVAL / APPROVED FOR CONSTRUCTION / REVISED & APPROVED FOR CONSTRUCTION

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE AND/OR REV. NO.

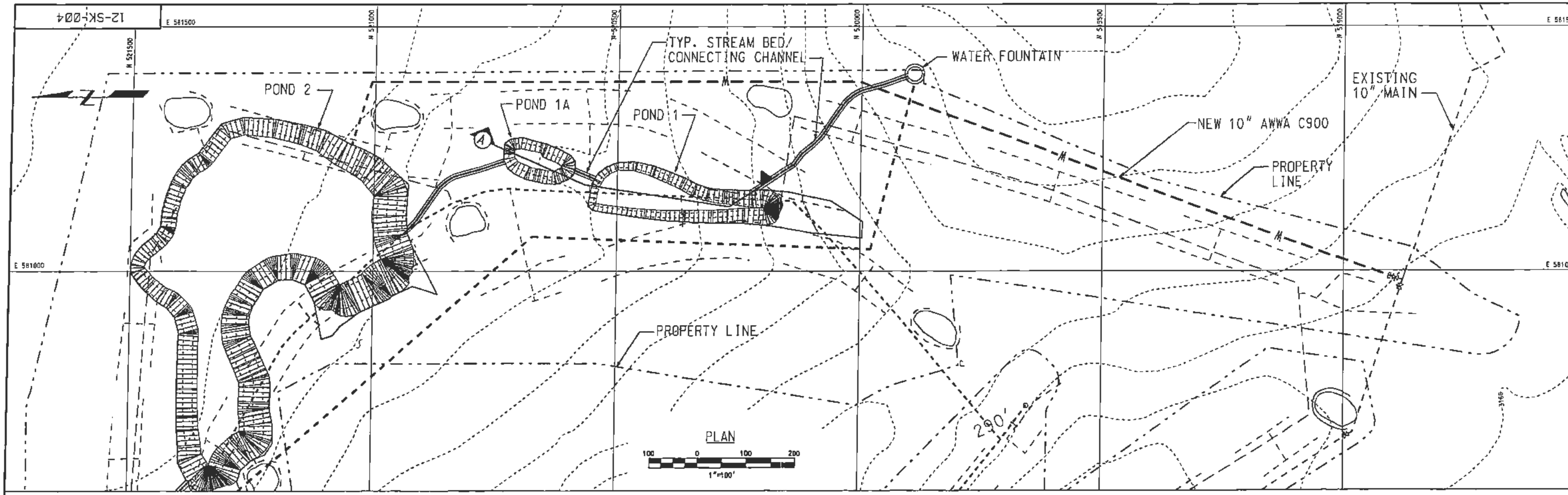
CIVIL UNDERGROUND UTILITIES PLAN

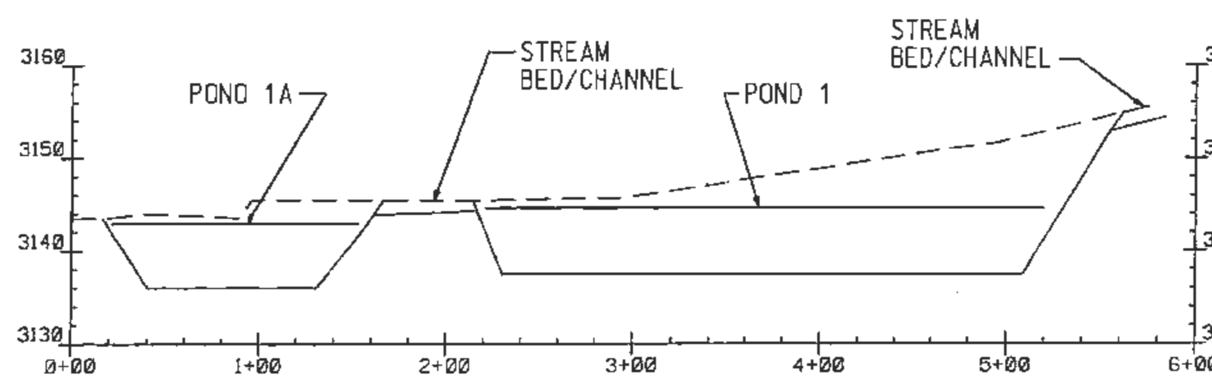
SCALE: 1"=200'

WASTEWATER REUSE PROJECT—PHASE 2
CITY OF CARLSBAD

Washington

DWG. NO. 12-SK-003
ORDER NO. 26759-001 REV P





PROFILE 'A'
SCALE: 1" = 50' (HORIZ.) 1" = 10' (VERT.)

PRELIMINARY

CIVIL
PLAN AND PROFILE
SHT. 1 OF 4

SCALE: 1"=100'

WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

Washington

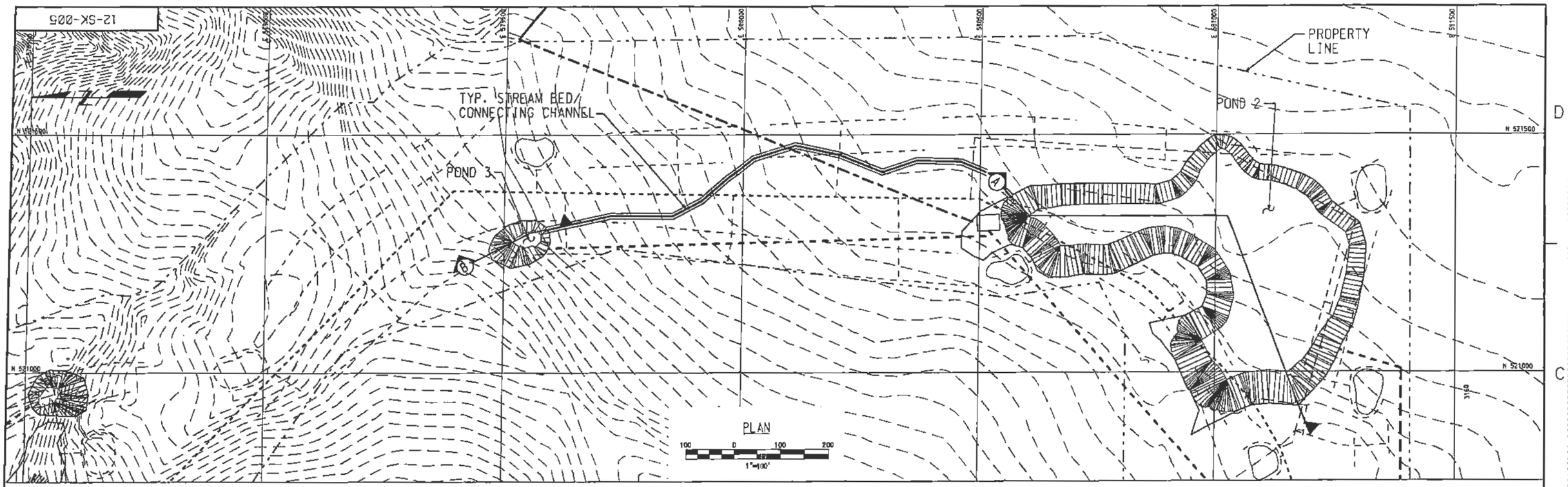
DWG. NO. 12-SK-004
ORDER NO. 26759-001 REV P

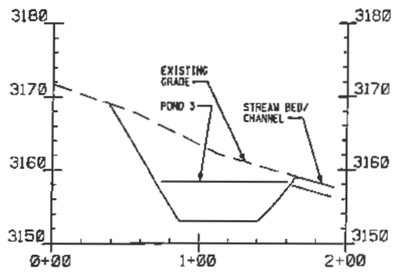
DRAWING RECORD: DESIGNER BP; CADD FILE DATA; FILE: 12sk004.dgn; UPDATED: BY: BP

DRAWING STATUS: ISSUED — PRELIMINARY; FOR COMMENTS AND/OR APPROVAL; APPROVED FOR CONSTRUCTION; REVISED & APPROVED FOR CONSTRUCTION

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

12-SK-005





PROFILE 'B'
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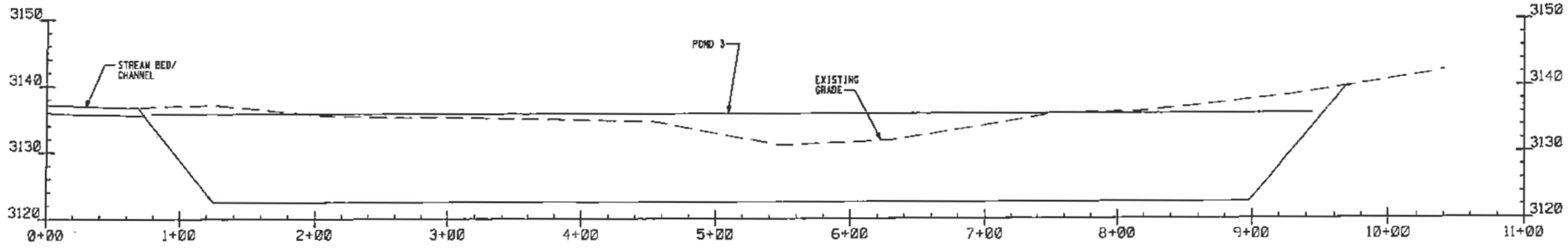
1" = 10' (VERT.)



PROFILE 'A'
SCALE: 1" = 50' (HORIZ.)
1" = 10' (VERT.)

PRELIIMINARY

WKNG	REF NO.	DATE	REVISIONS	DSNR	CH'D
	P		FOR REVIEW		

REVISION APPROVAL RECORD				REV	
DISCIPLINE	REVIEWED	DATE	DISCIPLINE	REVIEWED	DATE
CIVIL			PIPING		
STRUCTURAL			ELECTRICAL		
HVAC			ARCHITECTURAL		
MECHANICAL			INST & CONTROL		
PROCESS			ENVIRONMENTAL		
NUCLEAR			GEN. ARRANG.		

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CHECKER	
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UPDATED: 04/30/13 BY: BP	

PRINT DISTRIBUTION RECORD	
DATE	
FOR	
REV. NO.	
CLIENT	
FIELD	
INTRA CO.	

DRAWING STATUS				
ISSUED	REV.	DATE	SDE	PEM
PRELIMINARY				
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO

CIVIL
PLAN AND PROFILE
SHT. 2 OF 4

SCALE: 1"=100'

WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

Washington

DWG. NO. 12-SK-005

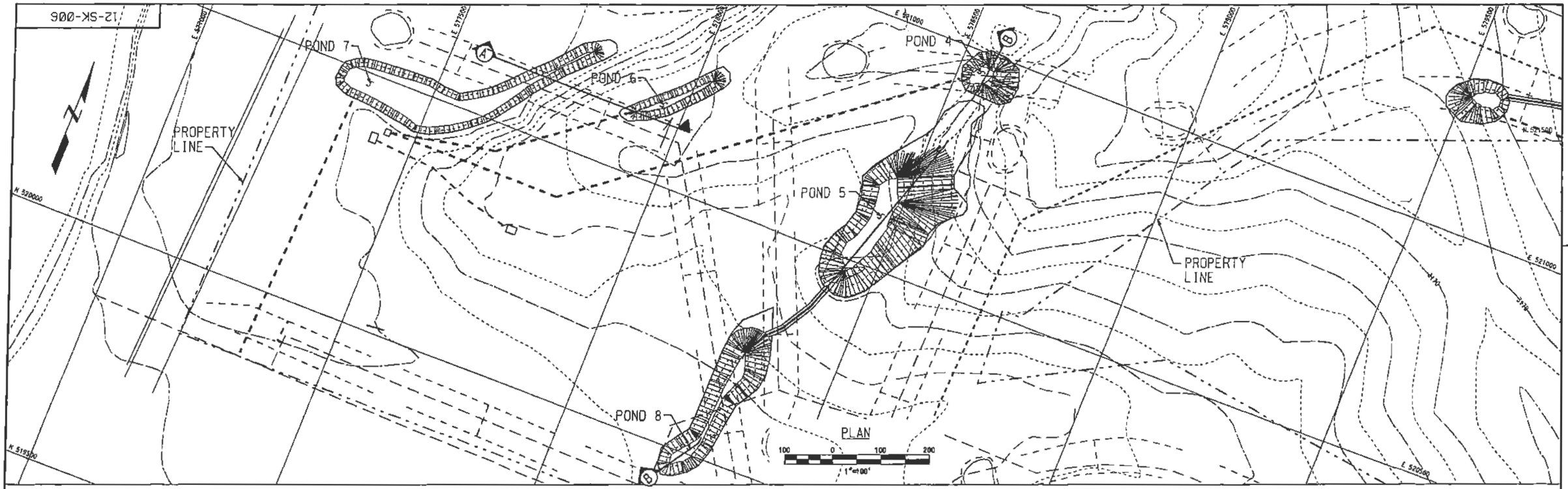
ORDER NO. 26759-001 REV P

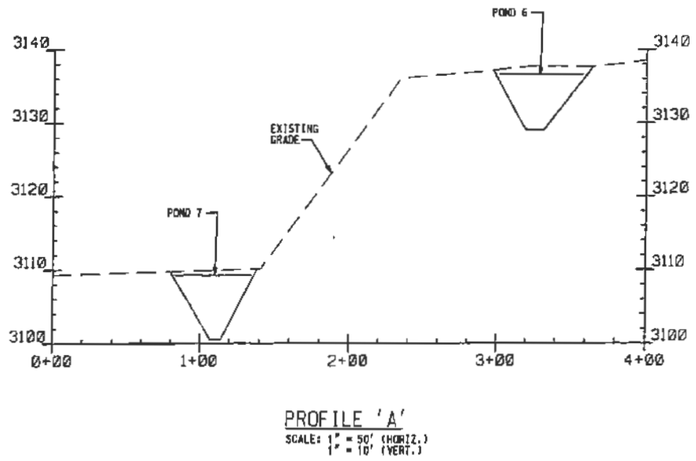
INCHES 1 CENTIMETERS 1 2 3 4 5 6

9 8 7 6 5 4 3 2 1

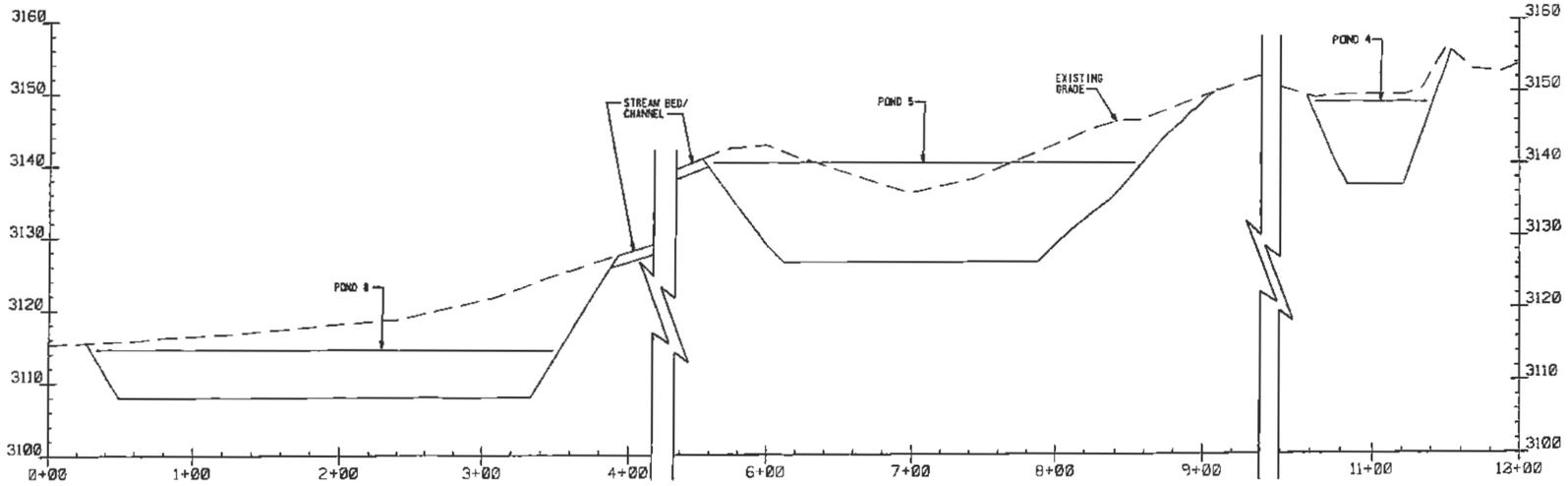
D C B A

12-SK-006





PROFILE 'A'
SCALE: 1" = 50' (HORIZ.)
1" = 10' (VERT.)



PROFILE 'B'
SCALE: 1" = 50' (HORIZ.)
1" = 10' (VERT.)

PRELIMINARY

W/CAD	REV NO	DATE	REVISIONS	DSNR	CH'D
	P		FOR REVIEW		

REVISION APPROVAL RECORD				REV	
DISCIPLINE	REVIEWED	DATE	DISCIPLINE	REVIEWED	DATE
CIVIL			PIPING		
STRUCTURAL			ELECTRICAL		
HVAC			ARCHITECTURAL		
MECHANICAL			INST & CONTROL		
PROCESS			ENVIRONMENTAL		
NUCLEAR			GEN. ARRANG.		

DRAWING RECORD		
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CHECKER		
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UPDATED: 04/15/08	BY: BP	

PRINT DISTRIBUTION RECORD														
DATE														
FOR														
REV. NO.														
CLIENT														
FIELD														
INTRA CO.														

DRAWING STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

CIVIL
PLAN AND PROFILE
SHT. 3 OF 4

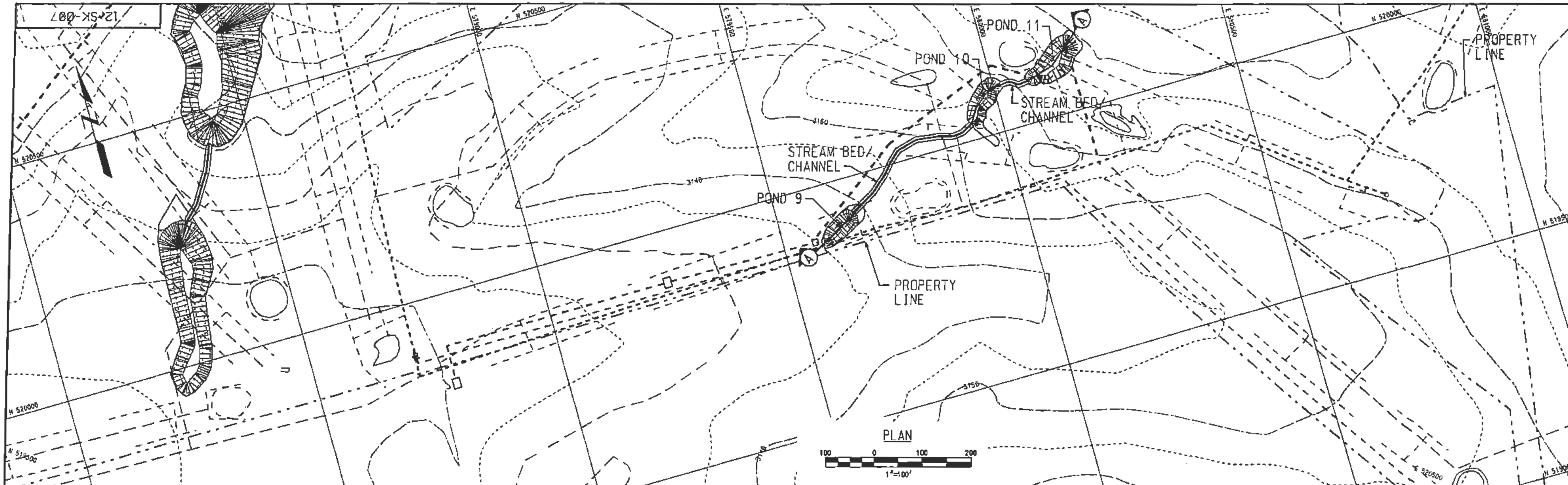
SCALE: 1"=100'

WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

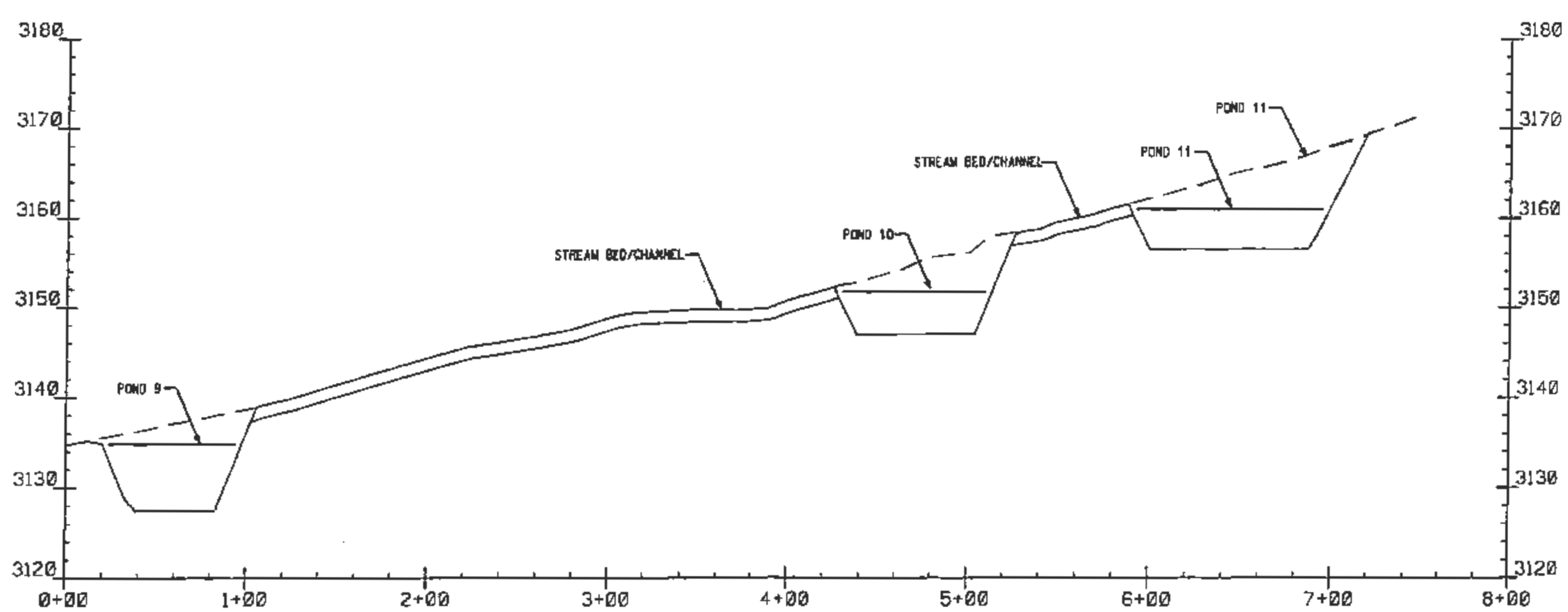
Washington

DWG. NO. 12-SK-006

ORDER NO. 26759-001 REV P



PLAN



PROFILE 'A'
SCALE: 1" = 50' (HORIZ.)
1" = 10' (VERT.)

PRELIMINARY

MICRO	REV NO	DATE	REVISIONS	DSNR	CH'D
	P		FOR REVIEW		

REVISION APPROVAL RECORD				REV	
DISCIPLINE	REVIEWED	DATE	DISCIPLINE	REVIEWED	DATE
CIVIL			PIPING		
STRUCTURAL			ELECTRICAL		
HVAC			ARCHITECTURAL		
MECHANICAL			INST & CONTROL		
PROCESS			ENVIRONMENTAL		
NUCLEAR			GEN. ARRANG.		

DRAWING RECORD		
DESIGNER	BP	04/3/10
CHECKER		
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FILE: 12sk007.dgn		
UPDATED: 04/6/10 BY: BP		

PRINT DISTRIBUTION RECORD: DATE / FOR / REV. NO. / CLIENT / FIELD / INTRA CO.

DRAWING STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY				
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO

CIVIL
PLAN AND PROFILE
SHT. 4 OF 4

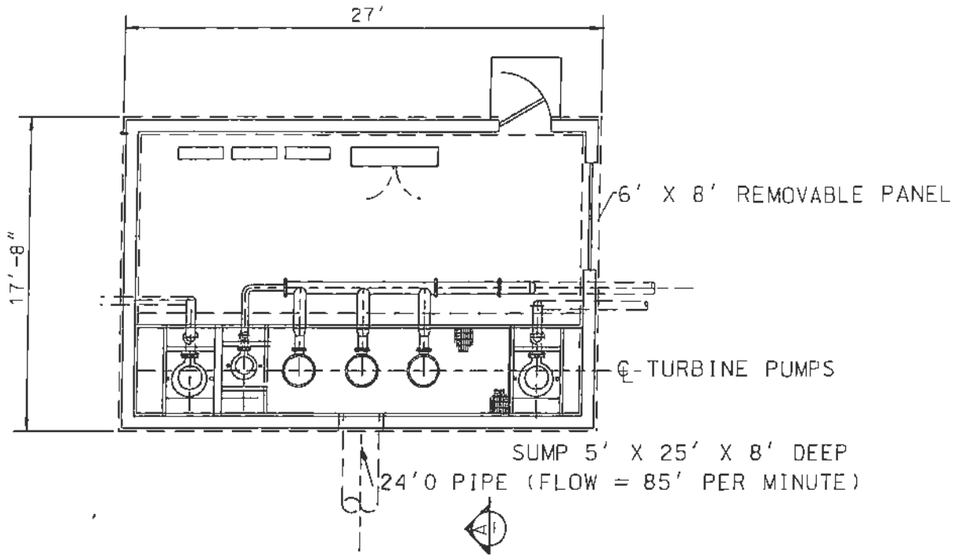
SCALE: 1"=100'

WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

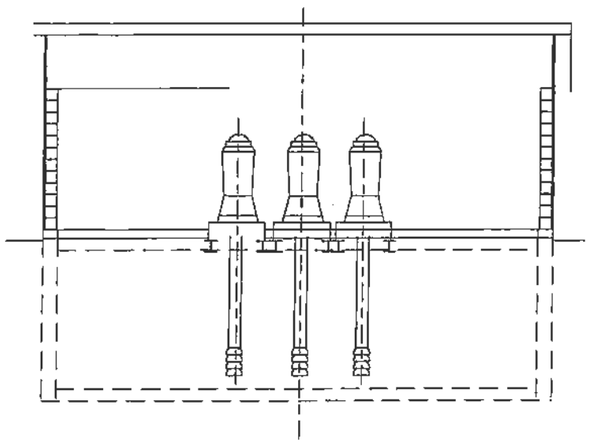
Washington

DWG. NO. 12-SK-007
ORDER NO. 26759-001 REV P

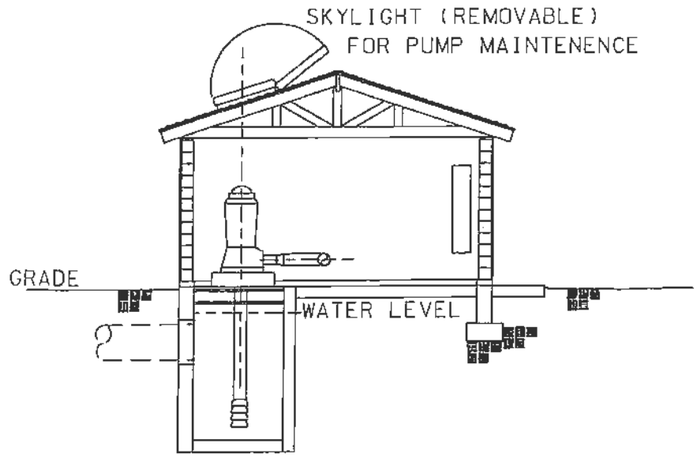
12-SK-009



PLAN
PUMP HOUSE



SECTION A



SECTION B

MICRO	REV NO	DATE	REVISIONS	DSNR	CH'D
	P		FOR REVIEW		

REVISION APPROVAL RECORD				REV	
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CIVIL			PIPING		
STRUCTURAL			ELECTRICAL		
HVAC			ARCHITECTURAL		
MECHANICAL			INST & CONTROL		
PROCESS			ENVIRONMENTAL		
NUCLEAR			GEN. ARRANG.		

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PRINT DISTRIBUTION RECORD

DATE	
FOR	
REV. NO.	
CLIENT	
FIELD	
INTRA CO.	

DRAWING STATUS

ISSUED	REV	DATE	SDE	PEM
PRELIMINARY				
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

STRUCTURAL
MAIN PUMP STATION
PLAN AND DETAILS

SCALE: AS SHOWN

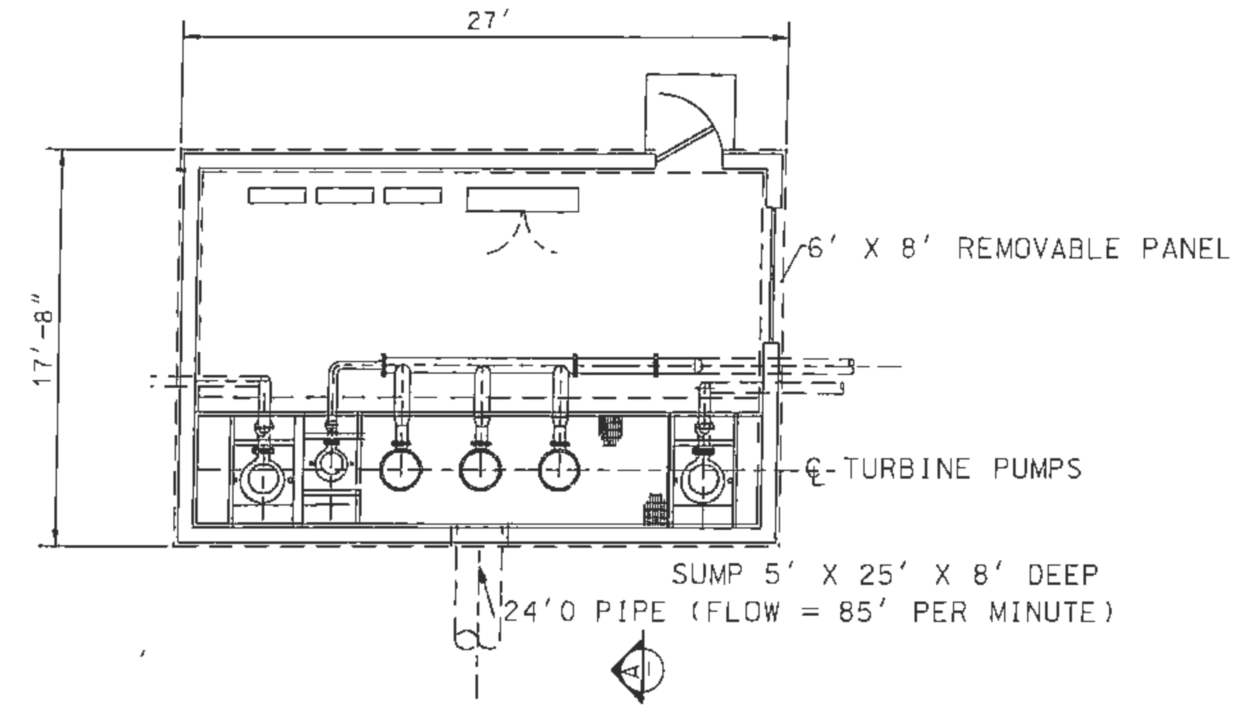
WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

Washington

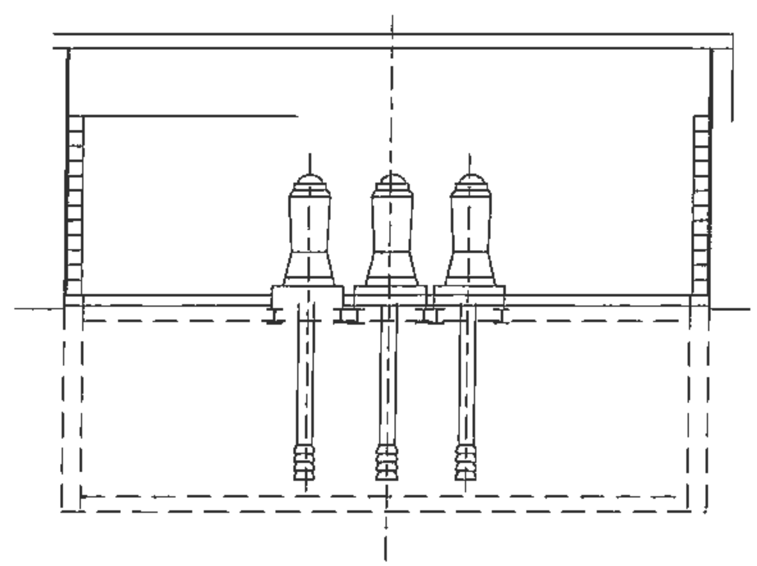
DWG. NO. 12-SK-009

ORDER NO. 26759-001 REV P

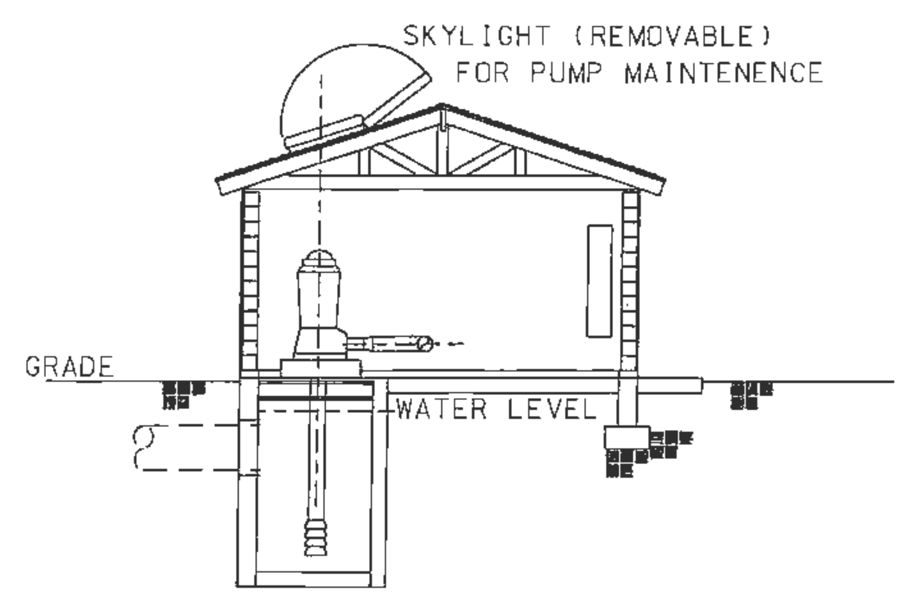
12-SK-009



PLAN
PUMP HOUSE



SECTION A



SECTION B

MICRO	REV NO	DATE	REVISIONS	DSNR	CH'D
	P		FOR REVIEW		

REVISION APPROVAL RECORD: CIVIL, STRUCTURAL, HVAC, MECHANICAL, PROCESS, NUCLEAR, PIPING, ELECTRICAL, ARCHITECTURAL, INST & CONTROL, ENVIRONMENTAL, GEN. ARRANG.

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CHECKER:
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UPDATED: 05/13/03 BY: BP

PRINT DISTRIBUTION RECORD: DATE, FOR, REV. NO., CLIENT, FIELD, INTRA CO.

DRAWING STATUS

ISSUED	REV	DATE	SOE	PEM
PRELIMINARY				
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

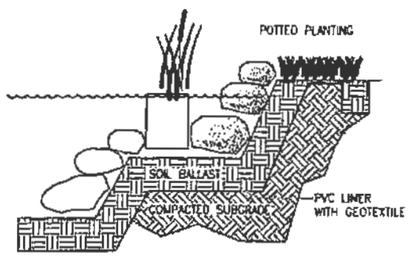
STRUCTURAL
MAIN PUMP STATION
PLAN AND DETAILS

SCALE: AS SHOWN

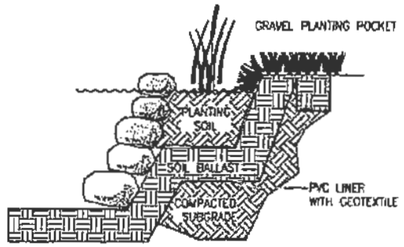
WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

Washington

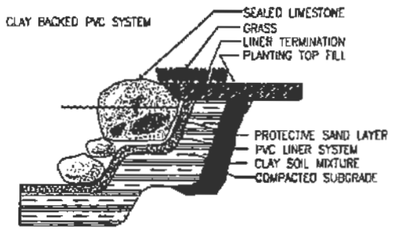
DWG. NO. 12-SK-009
ORDER NO. 26759-001 REV P



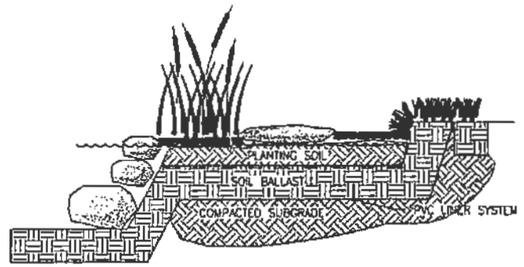
1 POTTED PLANTING POND EDGE
SCALE: NTS



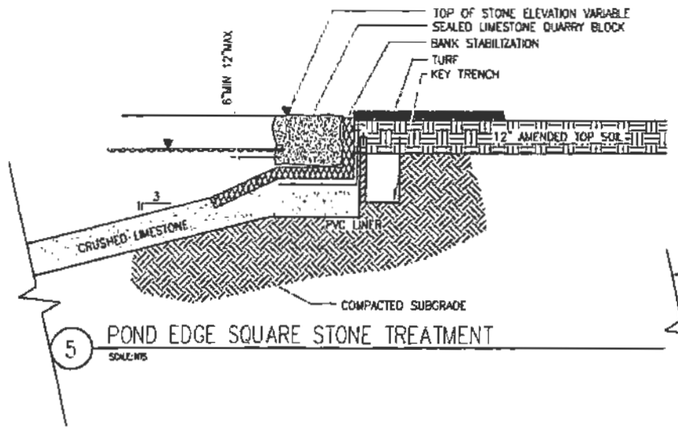
2 PLANTING POCKET POND EDGE
SCALE: NTS



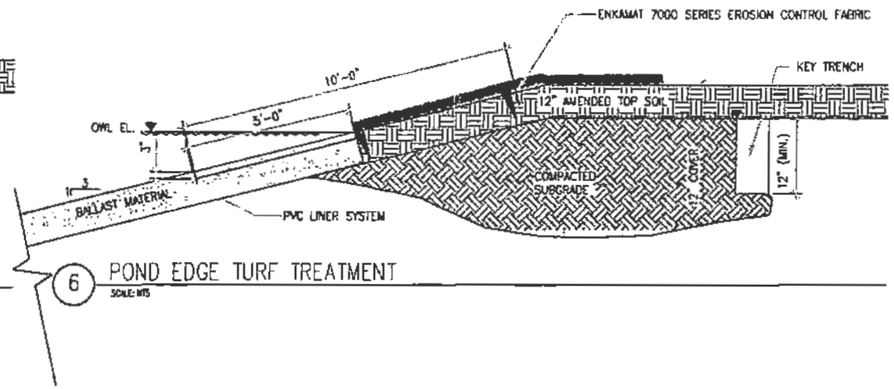
3 CLAY BACKED STONE POND EDGE
SCALE: NTS



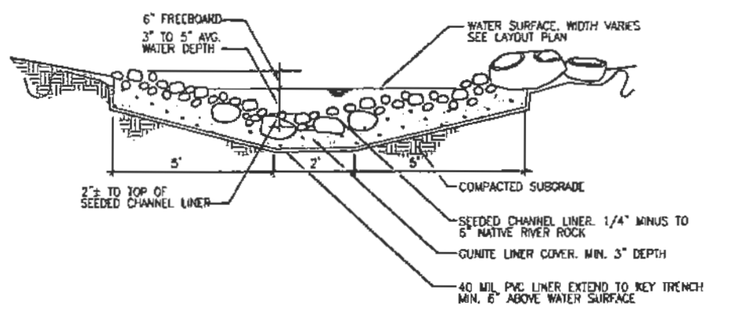
4 SHORELINE PLANTING W/STEPPING STONE
SCALE: NTS



5 POND EDGE SQUARE STONE TREATMENT
SCALE: NTS



6 POND EDGE TURF TREATMENT
SCALE: NTS



7 STREAM BED TYPICAL SECTION
SCALE: NTS

MICRO	REV NO	DATE	REVISIONS	DSNR	CHKD

REVISION APPROVAL RECORD

DISCIPLINE	REVIEWED	DATE	DISCIPLINE	REVIEWED	DATE
CIVIL			PIPING		
STRUCTURAL			ELECTRICAL		
HVAC			ARCHITECTURAL		
MECHANICAL			INST. & CONTROL		
PROCESS			ENVIRONMENTAL		
NUCLEAR			GEN. ARRANG.		

REV

REVIEWED	DATE

DRAWING RECORD

DESIGNER
CHECKER
CADD FILE DATA
TYPE: VERSION:
MODE:
PATH:
FILE: 12sk012dwg
UPDATED BY:

PRINT DISTRIBUTION RECORD

DATE
FOR
REV NO
CLIENT
FIELD
INTRA CO.

DRAWING STATUS

ISSUED	REV	DATE	SDE	PEM
PRELIMINARY				
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

SECTIONS

SCALE:

WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

Washington

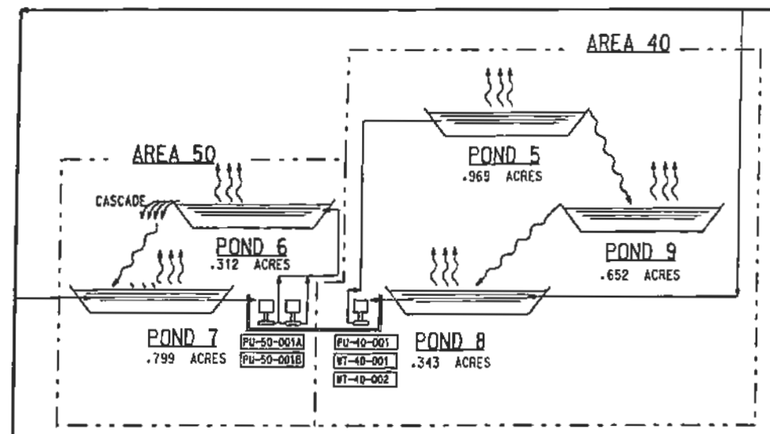
DWG. NO. 12-SK-010
ORDER NO. 26759-001 REV

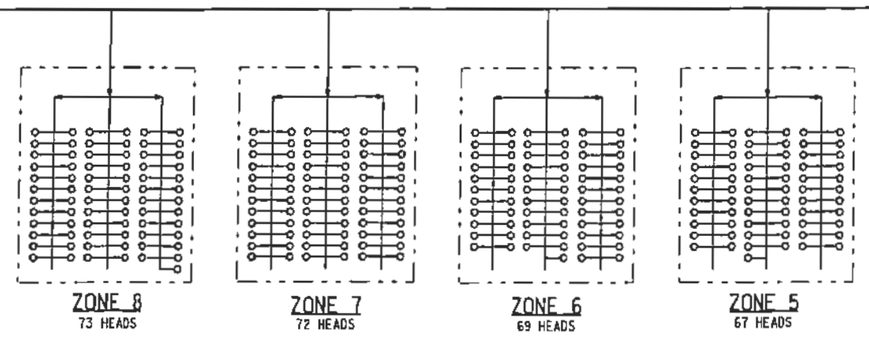
INCHES 1 2 CENTIMETERS 1 2 3 4 5 6

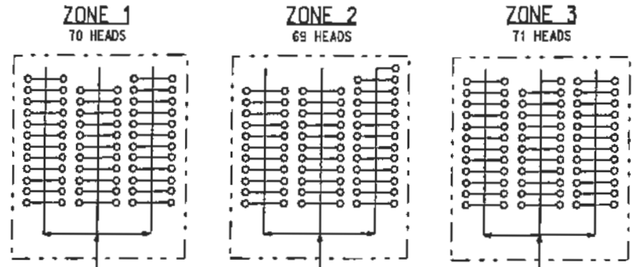
8 7 6 5 4 3 2 1

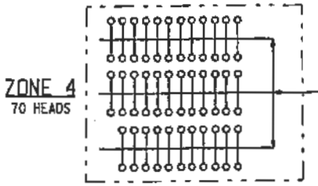
D C B A

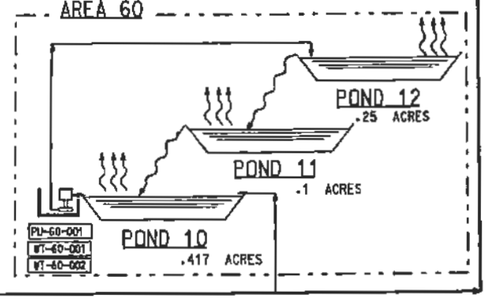
16-SK-001

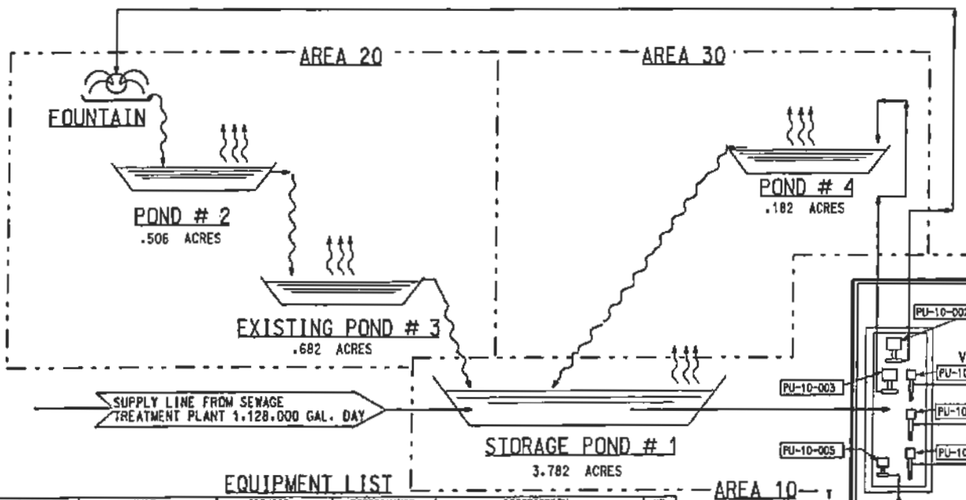












SYMBOLS LEGEND

- LAKE....
- EVAPORATION....
- PUMP....
- O'FLOW CHANNEL....
- SPRINKLER HEADS....
- SUBMURSABLE PUMP...
- SUBMURSABLE PUMP...
- FOUNTAIN...

WATER USAGE PER DAY	LAKE # 1 EVAP *	LAKE # 2 EVAP *	LAKE # 3 EVAP (EXIST)*	LAKE # 4 EVAP *	LAKE # 5 EVAP *	LAKE # 6 EVAP *	LAKE # 7 EVAP *	LAKE # 8 EVAP *	LAKE # 9 EVAP *	LAKE # 10 EVAP *	LAKE # 11 EVAP *	LAKE # 12 EVAP *	MISC USAGE **	TOTAL EVAPORATION	ZONE # 1	ZONE # 2	ZONE # 3	ZONE # 4	ZONE # 5	ZONE # 6	ZONE # 7	ZONE # 8	TOTAL USAGE MAX INFLOW	TOTAL USAGE
GALLONS PER DAY	50,520	6,812	9,182	2,450	13,047	4,376	1,075	4,618	6,779	5,614	3,365	1,346	46,732	168,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	1,128,000	1,128,000
HOURS PER DAY	24	24	24	24	24	24	24	24	24	24	24	24	24		1	1	1	1	1	1	1	1	24	24
GALLONS PER MIN.	35.4	4.7	6.4	1.7	9	3	7.5	3.2	6	3.9	2.3	1	32	116.7	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1440	1440

EQUIPMENT LIST

TAG NO	NAME	SERVICE	PERFORMANCE	DESCRIPTION	HP
PU-10-001A/B/C	IRRIGATION SUPPLY PUMP	IRRIGATION SYSTEM	3100 GPM, 160 PSIG	VERTICAL TURBINE (VFD)	150
PU-10-002	AREA 20 RECIRC. PUMP	FOUNTAIN & POND 2	750 GPM, 30 PSIG	SUBMERSABLE	20
PU-10-003	AREA 30 RECIRC. PUMP	POND 4	750 GPM, 30 PSIG	SUBMERSIBLE	20
PU-10-004	RECIRC. PUMP	SPARE- RECIRC. PUMP	750 GPM, 30 PSIG	SUBMERSABLE	20
PU-10-005	IRRIGATION PRES. PUMP	IRRIGATION SYSTEM		SUBMERSABLE	10
PU-40-001	RECIRC. PUMP	PONDS 5,6,& 9	750 GPM, 30 PSIG	SUBMERSABLE	20
WT-40-001	AERATION SYSTEM	PONDS 5,6,7,8,&9	750 GPM, 30 PSIG	SUBMERSABLE	20
WT-40-002	WATER TREATMENT	PONDS 5,6,7,8,&9	750 GPM, 30 PSIG	SUBMERSABLE (ONE STANDBY)	
PU-50-001A/B	AREA 50 RECIRC. PUMPS	CASCADE & PONDS 6,7		PKG'D COMPRESSOR, OZONE GENERATOR	
PU-60-001	AREA 60 RECIRC. PUMP	PONDS 10,11,&12		PKG'D TANK, MIXER, METERING PUMPS	
WT-60-001	AERATION SYSTEM	PONDS 10,11,&12			
WT-60-002	WATER TREATMENT	PONDS 10,11,&12			

NOTES:

1. QUANTITIES ARE BASED ON MAXIMUM USE OF WATER AVAILABLE FROM SEWAGE TREATMENT PLANT.
2. * MARKED EVAPORATION QUANTITIES ARE BASED ON SURFACE AREA, CONSIDERING ½" OF VOLUME LOSS PER 24 HR. PERIOD.
3. ** MARKED MISC. USAGE QUANTITY IS BASED ON SURFACE AREA OF WATER CHANNELS CONSIDERING ½" LOSS DUE TO EVAPORATION PER 24 HR. PERIOD. QUANTITY ALSO CONSIDERS MISC. USE OF WATER HOSES, POND LEAKAGE, ETC.

MICRO	REV NO	DATE	REVISIONS	DSNR	CH'D
	P		FOR REVIEW		

REVISION APPROVAL RECORD				REV
DISCIPLINE	REVIEWED	DATE	DISCIPLINE	REVIEWED DATE
CIVIL			PIPING	
STRUCTURAL			ELECTRICAL	
HVAC			ARCHITECTURAL	
MECHANICAL			INST & CONTROL	
PROCESS			ENVIRONMENTAL	
NUCLEAR			GEN. ARRANG.	

DRAWING RECORD		
DESIGNER	KL	10/2/10
CHECKER		
CADD FILE DATA		
TYPE: MS	VERS: 07	
NODE:		
PATH: gen eng/sse/cad/civil/dwg		
FILE:		
UPDATED: 10/3/10	BY: BP	

PRINT DISTRIBUTION RECORD	
DATE	
FOR	
REV. NO.	
CLIENT	
FIELD	
INTRA CO.	

DRAWING STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY				
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

PIPING FLOW DIAGRAM

SCALE: AS SHOWN

WASTEWATER REUSE PROJECT-PHASE 2
CITY OF CARLSBAD

Washington

DWG. NO. 16-SK-001

ORDER NO. 26759-001 REV P

INCHES 1 2 3 4 5 6
CENTIMETERS 1 2 3 4 5 6 7 8 9 10

D C B A

Appendix F
Estimated Probable Costs

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 2 - Estimate of Probable Costs

Item	Description	Unit	Quantity	Unit Price	Cost	Subtotal
1.0	**GENERAL CONDITIONS**					
	Mobilization	ls	1	5%	$ 219,000.00	
	Bonds & Permits	ls	1	5.50%	$ 241,000.00	
	Demobilization	ls	1	2%	$ 88,000.00	
				Subtotal	$ 548,000.00	**$ 548,000.00**
2.0	**MODIFICATIONS TO EXISTING REUSE PUMP STATION**					
	Vertical Turbine Pump	EA	3	$ 35,000.00	$ 105,000.00	
	Installation @ 20%	LS	3	$ 7,000.00	$ 21,000.00	
	Jockey Pump	EA	1	$ 7,500.00	$ 7,500.00	
	Installation @ 20%	LS	3	$ 1,500.00	$ 4,500.00	
	Piping Modifications	LS	1	$ 35,000.00	$ 35,000.00	
	Electrical & Instrumentation	LS	1	$ 25,000.00	$ 25,000.00	
	Contractor Markups @ %15	LS	1	$ 29,700.00	$ 29,700.00	
				Subtotal	$ 227,700.00	**$ 227,700.00**
3.0	**CHLORINE INJECTION (Sodium Hypochlorite)**					
	Metering Pumps	EA	2	$ 2,500.00	$ 5,000.00	
	Installation	LS	1	$ 2,000.00	$ 2,000.00	
	Chemical Piping	LS	1	$ 2,000.00	$ 2,000.00	
	Containment Equipment	LS	1	$ 6,000.00	$ 6,000.00	
	Repaint Structure	LS	1	$ 8,000.00	$ 8,000.00	
	Building Modifications	LS	1	$ 10,000.00	$ 10,000.00	
	Replace Doors and Frames	EA	1	$ 3,000.00	$ 3,000.00	
	Replace HVAC Equipment	LS	1	$ 20,000.00	$ 20,000.00	
	Electrical & Instrumentation	LS	1	$ 40,000.00	$ 40,000.00	
	Sitework	LS	1	$ 30,000.00	$ 30,000.00	
	Contractor Markups @ %15	LS	1	$ 14,400.00	$ 14,400.00	
				Subtotal	$ 140,400.00	**$ 140,400.00**
4.0	**REUSE STORAGE TANK**					
	2.0 MG Tank	LS	1	$ 1,000,000.00	$ 1,000,000.00	
	Foundation	LS	1	$ 30,000.00	$ 30,000.00	
	Piping and Valves	LS	1	$ 30,000.00	$ 30,000.00	
	Electrical & Instrumentation	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 162,000.00	$ 162,000.00	
				Subtotal	$ 1,242,000.00	**$ 1,242,000.00**
5.0	**REUSE TRANSFER PUMP STATION**					
	Pump Station Equipment	LS	1	$ 150,000.00	$ 150,000.00	
	Installation @ 20%	LS	1	$ 30,000.00	$ 30,000.00	
	Concrete	LS	1	$ 20,000.00	$ 20,000.00	
	Piping and Valves	LS	1	$ 65,000.00	$ 65,000.00	
	Electrical & Instrumentation	LS	1	$ 50,000.00	$ 50,000.00	
	Sitework	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 47,250.00	$ 47,250.00	
				Subtotal	$ 382,250.00	**$ 382,250.00**
6.0	**REPLACE REUSE PIPELINE**					
	Pipeburst 10" AC Pipe to 12" HDPE Pipe	LF	6000	$ 50.00	$ 300,000.00	
	Valves	EA	4	$ 2,500.00	$ 10,000.00	
	Contractor Markups @ %15	LS	1	$ 46,500.00	$ 46,500.00	
				Subtotal	$ 356,500.00	**$ 356,500.00**

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 2 - Estimate of Probable Costs

8.0 WEST REUSE STORAGE POND

Clear and Grub	LS	1	$ 1,500.00	$ 1,500.00	
Excavation	CY	4000	$ 15.00	$ 60,000.00	
Liner	SF	13000	$ 2.00	$ 26,000.00	
Landscaping	LS	10000	$ 1.00	$ 10,000.00	
10" Inlet Piping Connection	LF	300	$ 35.00	$ 10,500.00	
Site Restoration	LS	1	$ 5,000.00	$ 5,000.00	
Contractor Markups @ %15	LS	1	$ 16,950.00	$ 16,950.00	
			Subtotal	$ 129,950.00	**$ 129,950.00**

9.0 EAST REUSE STORAGE POND

Clear and Grub	LS	1	$ 1,500.00	$ 1,500.00	
Excavation	CY	3000	$ 15.00	$ 45,000.00	
Liner	SF	10200	$ 2.00	$ 20,400.00	
Landscaping	LS	5000	$ 1.00	$ 5,000.00	
10" Inlet Piping Connection	LF	100	$ 35.00	$ 3,500.00	
Site Restoration	LS	1	$ 5,000.00	$ 5,000.00	
Contractor Markups @ %15	LS	1	$ 12,060.00	$ 12,060.00	
			Subtotal	$ 92,460.00	**$ 92,460.00**

10.0 REUSE BOOSTER PUMP STATION NO. 2

Pump Station Equipment	LS	1	$ 500,000.00	$ 500,000.00	
Installation @ 20%	LS	1	$ 100,000.00	$ 100,000.00	
Concrete	LS	1	$ 20,000.00	$ 20,000.00	
Piping and Valves	LS	1	$ 65,000.00	$ 65,000.00	
Building	LS	1	$ 20,000.00	$ 20,000.00	
Electrical & Instrumentation	LS	1	$ 50,000.00	$ 50,000.00	
Sitework	LS	1	$ 20,000.00	$ 20,000.00	
Contractor Markups @ %15	LS	1	$ 113,250.00	$ 113,250.00	
			Subtotal	$ 888,250.00	**$ 888,250.00**

11.0 IRRIGATION PIPELINES

8" (Distribution Pipelines) PVC including trenching, backfill, compaction & surface restoration	LF	14000	$ 30.00	$ 420,000.00	
10" (Connect Par 3 & Riverview) PVC including trenching, backfill, compaction & surface restoration	LF	1280	$ 35.00	$ 44,800.00	
10" (Irrigation Loop) PVC including trenching, backfill, compaction & surface restoration	LF	5900	$ 35.00	$ 206,500.00	
12" River Crossing	LF	1270	$ 120.00	$ 152,400.00	
Contractor Markups @ %15	LS	1	$ 100,695.00	$ 100,695.00	
			Subtotal	$ 924,395.00	**$ 924,395.00**

	Subtotal Excluding NMGRT		**$ 4,931,905.00**
	Contingency	30.0%	$ 1,479,572
			$ 6,411,477
	Engineering	10.0%	$ 641,148
	Surveying & Geotechnical	3.0%	$ 192,344
	Construction Related Services	4.0%	$ 256,459
	Administration	1.0%	$ 64,115
			$ 7,565,542
	NMGRT @	7.4375%	$ 562,687
		Total	**$ 8,128,229**

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 3 - Estimate of Probable Costs

Item	Description	Unit	Quantity	Unit Price	Cost	Subtotal
1.0	**GENERAL CONDITIONS**					
	Mobilization	ls	1	5%	$ 238,000.00	
	Bonds & Permits	ls	1	5.50%	$ 262,000.00	
	Demobilization	ls	1	2%	$ 95,000.00	
				Subtotal	$ 595,000.00	**$ 595,000.00**
2.0	**MODIFICATIONS TO EXISTING REUSE PUMP STATION**					
	Vertical Turbine Pump	EA	3	$ 30,000.00	$ 90,000.00	
	Installation @ 20%	LS	3	$ 6,000.00	$ 18,000.00	
	Piping Modifications	LS	1	$ 35,000.00	$ 35,000.00	
	Electrical & Instrumentation	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 24,450.00	$ 24,450.00	
				Subtotal	$ 187,450.00	**$ 187,450.00**
3.0	**REUSE WATER TREATMENT (Sodium Hypochlorite)**					
	Metering Pumps	EA	2	$ 2,500.00	$ 5,000.00	
	Installation	LS	1	$ 2,000.00	$ 2,000.00	
	Chemical Piping	LS	1	$ 2,000.00	$ 2,000.00	
	Containment Equipment	LS	1	$ 6,000.00	$ 6,000.00	
	Repaint Structure	LS	1	$ 8,000.00	$ 8,000.00	
	Building Modifications	LS	1	$ 10,000.00	$ 10,000.00	
	Replace Doors and Frames	EA	1	$ 3,000.00	$ 3,000.00	
	Replace HVAC Equipment	LS	1	$ 20,000.00	$ 20,000.00	
	Electrical & Instrumentation	LS	1	$ 40,000.00	$ 40,000.00	
	Sitework	LS	1	$ 30,000.00	$ 30,000.00	
	Contractor Markups @ %15	LS	1	$ 14,400.00	$ 14,400.00	
				Subtotal	$ 140,400.00	**$ 140,400.00**
4.0	**REUSE STORAGE TANK**					
	1.15 MG Tank	LS	1	$ 575,000.00	$ 575,000.00	
	Foundation	LS	1	$ 22,000.00	$ 22,000.00	
	Piping and Valves	LS	1	$ 30,000.00	$ 30,000.00	
	Electrical & Instrumentation	LS	1	$ 10,000.00	$ 10,000.00	
	Contractor Markups @ %15	LS	1	$ 95,550.00	$ 95,550.00	
				Subtotal	$ 732,550.00	**$ 732,550.00**
5.0	**REUSE TRANSFER PUMP STATION**					
	Pump Station Equipment	LS	1	$ 150,000.00	$ 150,000.00	
	Installation @ 20%	LS	1	$ 30,000.00	$ 30,000.00	
	Concrete	LS	1	$ 20,000.00	$ 20,000.00	
	Piping and Valves	LS	1	$ 150,000.00	$ 150,000.00	
	Electrical & Instrumentation	LS	1	$ 50,000.00	$ 50,000.00	
	Sitework	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 60,000.00	$ 60,000.00	
				Subtotal	$ 480,000.00	**$ 480,000.00**
6.0	**REUSE IRRIGATION PUMP STATION NO. 2**					
	Pump Station Equipment	LS	1	$ 500,000.00	$ 500,000.00	
	Installation @ 20%	LS	1	$ 100,000.00	$ 100,000.00	
	Concrete	LS	1	$ 20,000.00	$ 20,000.00	
	Piping and Valves	LS	1	$ 65,000.00	$ 65,000.00	
	Building	LS	1	$ 20,000.00	$ 20,000.00	
	Electrical & Instrumentation	LS	1	$ 50,000.00	$ 50,000.00	
	Sitework	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 113,250.00	$ 113,250.00	
				Subtotal	$ 888,250.00	**$ 888,250.00**

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 3 - Estimate of Probable Costs

7.0 SLIPLINE EXISTING FORCEMAIN

18" HDPE Slipline	LF	13000	$ 80.00	$ 1,040,000.00	
Pre-CCTV Inspection	LF	13000	$ 3.00	$ 39,000.00	
Hydrostatic Test	LS	1	$ 25,000.00	$ 25,000.00	
Post-CCTV Inspection	LF	13000	$ 3.00	$ 39,000.00	
Contractor Markups @ %15	LS	1	$ 165,600.00	$ 165,600.00	
			Subtotal	$ 1,308,600.00	**$ 1,308,600.00**

8.0 IRRIGATION PIPELINE

4" PVC including trenching, backfill, compaction & surface restoration	LF	1300	$ 15.00	$ 19,500.00	
8" PVC including trenching, backfill, compaction & surface restoration	LF	13800	$ 30.00	$ 414,000.00	
10" PVC including trenching, backfill, compaction & surface restoration	LF	1280	$ 35.00	$ 44,800.00	
12" PVC including trenching, backfill, compaction & surface restoration	LF	9710	$ 40.00	$ 388,400.00	
18" PVC including trenching, backfill, compaction & surface restoration	LF	500	$ 50.00	$ 25,000.00	
Contractor Markups @ %15	LS	1	$ 133,755.00	$ 133,755.00	
			Subtotal	$ 1,025,455.00	**$ 1,025,455.00**

Subtotal Excluding NMGRT		**$**	**5,357,705.00**
Contingency	30.0%	$	1,607,312
		$	6,965,017
Engineering	10.0%	$	696,502
Surveying & Geotechnical	3.0%	$	208,950
Construction Related Services	4.0%	$	278,601
Administration	1.0%	$	69,650
		$	**8,218,719**
NMGRT @	7.4375%	$	611,267
	Total	**$**	**8,829,987**

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 4 - Estimate of Probable Costs

Item	Description	Unit	Quantity	Unit Price	Cost	Subtotal
1.0	**GENERAL CONDITIONS**					
	Mobilization	ls	1	5%	$ 247,000.00	
	Bonds & Permits	ls	1	5.50%	$ 271,000.00	
	Demobilization	ls	1	2%	$ 99,000.00	
				Subtotal	$ 617,000.00	**$ 617,000.00**
2.0	**MODIFICATIONS TO EXISTING REUSE PUMP STATION**					
	Vertical Turbine Pump	EA	3	$ 30,000.00	$ 90,000.00	
	Installation @ 20%	LS	3	$ 6,000.00	$ 18,000.00	
	Piping Modifications	LS	1	$ 35,000.00	$ 35,000.00	
	Electrical & Instrumentation	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 24,450.00	$ 24,450.00	
				Subtotal	$ 187,450.00	**$ 187,450.00**
3.0	**REUSE WATER TREATMENT (Sodium Hypochlorite)**					
	Metering Pumps	EA	2	$ 2,500.00	$ 5,000.00	
	Installation	LS	1	$ 2,000.00	$ 2,000.00	
	Chemical Piping	LS	1	$ 2,000.00	$ 2,000.00	
	Containment Equipment	LS	1	$ 6,000.00	$ 6,000.00	
	Repaint Structure	LS	1	$ 8,000.00	$ 8,000.00	
	Building Modifications	LS	1	$ 10,000.00	$ 10,000.00	
	Replace Doors and Frames	EA	1	$ 3,000.00	$ 3,000.00	
	Replace HVAC Equipment	LS	1	$ 20,000.00	$ 20,000.00	
	Electrical & Instrumentation	LS	1	$ 40,000.00	$ 40,000.00	
	Sitework	LS	1	$ 30,000.00	$ 30,000.00	
	Contractor Markups @ %15	LS	1	$ 14,400.00	$ 14,400.00	
				Subtotal	$ 140,400.00	**$ 140,400.00**
4.0	**REUSE STORAGE TANK**					
	1.0 MG Tank	LS	1	$ 500,000.00	$ 500,000.00	
	Foundation	LS	1	$ 20,000.00	$ 20,000.00	
	Piping and Valves	LS	1	$ 30,000.00	$ 30,000.00	
	Electrical & Instrumentation	LS	1	$ 25,000.00	$ 25,000.00	
	Contractor Markups @ %15	LS	1	$ 86,250.00	$ 86,250.00	
				Subtotal	$ 661,250.00	**$ 661,250.00**
5.0	**REUSE TRANSFER PUMP STATION**					
	Pump Station Equipment	LS	1	$ 150,000.00	$ 150,000.00	
	Installation @ 20%	LS	1	$ 30,000.00	$ 30,000.00	
	Concrete	LS	1	$ 20,000.00	$ 20,000.00	
	Piping and Valves	LS	1	$ 150,000.00	$ 150,000.00	
	Electrical & Instrumentation	LS	1	$ 50,000.00	$ 50,000.00	
	Sitework	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 60,000.00	$ 60,000.00	
				Subtotal	$ 480,000.00	**$ 480,000.00**
6.0	**REUSE IRRIGATION PUMP STATION NO. 2**					
	Pump Station Equipment	LS	1	$ 500,000.00	$ 500,000.00	
	Installation @ 20%	LS	1	$ 100,000.00	$ 100,000.00	
	Concrete	LS	1	$ 20,000.00	$ 20,000.00	
	Piping and Valves	LS	1	$ 65,000.00	$ 65,000.00	
	Building	LS	1	$ 20,000.00	$ 20,000.00	
	Electrical & Instrumentation	LS	1	$ 50,000.00	$ 50,000.00	
	Sitework	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 113,250.00	$ 113,250.00	
				Subtotal	$ 888,250.00	**$ 888,250.00**

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 4 - Estimate of Probable Costs

7.0 SLIPLINE EXISTING FORCEMAIN

18" HDPE Slipline	LF	13000	$ 80.00	$ 1,040,000.00	
Pre-CCTV Inspection	LF	13000	$ 3.00	$ 39,000.00	
Hydrostatic Test	LS	1	$ 25,000.00	$ 25,000.00	
Post-CCTV Inspection	LF	13000	$ 3.00	$ 39,000.00	
Contractor Markups @ %15	LS	1	$ 165,600.00	$ 165,600.00	
			Subtotal	$ 1,308,600.00	**$ 1,308,600.00**

8.0 IRRIGATION PIPELINES

4" PVC including trenching, backfill, compaction & surface restoration	LF	1300	$ 15.00	$ 19,500.00	
8" PVC including trenching, backfill, compaction & surface restoration	LF	20150	$ 30.00	$ 604,500.00	
10" PVC including trenching, backfill, compaction & surface restoration	LF	1280	$ 35.00	$ 44,800.00	
12" PVC including trenching, backfill, compaction & surface restoration	LF	10200	$ 40.00	$ 408,000.00	
18" PVC including trenching, backfill, compaction & surface restoration	LF	500	$ 50.00	$ 25,000.00	
Contractor Markups @ %15	LS	1	$ 165,270.00	$ 165,270.00	
			Subtotal	$ 1,267,070.00	**$ 1,267,070.00**

Subtotal Excluding NMGRT		**$**	**5,550,020**
Contingency	30.0%	$	1,665,006
		$	7,215,026
Engineering	10.0%	$	721,503
Surveying & Geotechnical	3.0%	$	216,451
Construction Related Services	4.0%	$	288,601
Administration	1.0%	$	72,150
		$	**8,513,731**
NMGRT @	7.4375%	$	633,209
	Total	**$**	**9,146,939**

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 2 (Phased) - Estimate of Probable Costs
Phase I

Item	Description	Unit	Quantity	Unit Price	Cost	Subtotal
1.0	**GENERAL CONDITIONS**					
	Mobilization	ls	1	5%	$ 51,000.00	
	Bonds & Permits	ls	1	5.50%	$ 56,000.00	
	Demobilization	ls	1	2%	$ 20,000.00	
				Subtotal	$ 127,000.00	**$ 127,000.00**
2.0	**MODIFICATIONS TO EXISTING REUSE PUMP STATION**					
	Vertical Turbine Pump	EA	3	$ 35,000.00	$ 105,000.00	
	Installation @ 20%	LS	3	$ 7,000.00	$ 21,000.00	
	Jockey Pump	EA	1	$ 7,500.00	$ 7,500.00	
	Installation @ 20%	LS	3	$ 1,500.00	$ 4,500.00	
	Piping Modifications	LS	1	$ 35,000.00	$ 35,000.00	
	Electrical & Instrumentation	LS	1	$ 25,000.00	$ 25,000.00	
	Contractor Markups @ %15	LS	1	$ 29,700.00	$ 29,700.00	
				Subtotal	$ 227,700.00	**$ 227,700.00**
3.0	**CHLORINE INJECTION (Sodium Hypochlorite)**					
	Metering Pumps	EA	2	$ 2,500.00	$ 5,000.00	
	Installation	LS	1	$ 2,000.00	$ 2,000.00	
	Chemical Piping	LS	1	$ 2,000.00	$ 2,000.00	
	Containment Equipment	LS	1	$ 6,000.00	$ 6,000.00	
	Repaint Structure	LS	1	$ 8,000.00	$ 8,000.00	
	Building Modifications	LS	1	$ 10,000.00	$ 10,000.00	
	Replace Doors and Frames	EA	1	$ 3,000.00	$ 3,000.00	
	Replace HVAC Equipment	LS	1	$ 20,000.00	$ 20,000.00	
	Electrical & Instrumentation	LS	1	$ 40,000.00	$ 40,000.00	
	Sitework	LS	1	$ 30,000.00	$ 30,000.00	
	Contractor Markups @ %15	LS	1	$ 14,400.00	$ 14,400.00	
				Subtotal	$ 140,400.00	**$ 140,400.00**
4.0	**REPLACE REUSE PIPELINE**					
	Pipeburst 10" AC Pipe to 12" HDPE Pipe	LF	6000	$ 50.00	$ 300,000.00	
	Valves	EA	4	$ 2,500.00	$ 10,000.00	
	Contractor Markups @ %15	LS	1	$ 46,500.00	$ 46,500.00	
				Subtotal	$ 356,500.00	**$ 356,500.00**
5.0	**IRRIGATION PIPELINE IMPROVEMENTS**					
	10" (Connect Par 3 & Riverview) PVC including trenching, backfill, compaction & surface restoration	LF	1280	$ 35.00	$ 44,800.00	
	10" (Irrigation Loop) PVC including trenching, backfill, compaction & surface restoration	LF	5900	$ 35.00	$ 206,500.00	
	Contractor Markups @ %15	LS	1	$ 37,695.00	$ 37,695.00	
				Subtotal	$ 288,995.00	**$ 288,995.00**

Subtotal Excluding NMGRT			**$ 1,140,595.00**
Contingency	30.0%	$	342,179
		$	1,482,774
Engineering	10.0%	$	148,277
Surveying & Geotechnical	3.0%	$	44,483
Construction Related Services	4.0%	$	59,311
Administration	1.0%	$	14,828
		$	**1,749,673**
NMGRT @	7.4375%	$	130,132
	Total	**$**	**1,879,805**

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 2 (Phased) - Estimate of Probable Costs
Phase II

Item	Description	Unit	Quantity	Unit Price	Cost	Subtotal
1.0	**GENERAL CONDITIONS**					
	Mobilization	ls	1	5%	$ 81,000.00	
	Bonds & Permits	ls	1	5.50%	$ 89,000.00	
	Demobilization	ls	1	2%	$ 32,000.00	
				Subtotal	$ 202,000.00	**$ 202,000.00**
2.0	**REUSE STORAGE TANK**					
	2.0 MG Tank	LS	1	$ 1,000,000.00	$ 1,000,000.00	
	Foundation	LS	1	$ 30,000.00	$ 30,000.00	
	Piping and Valves	LS	1	$ 30,000.00	$ 30,000.00	
	Electrical & Instrumentation	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 162,000.00	$ 162,000.00	
				Subtotal	$ 1,242,000.00	**$ 1,242,000.00**
3.0	**REUSE TRANSFER PUMP STATION**					
	Pump Station Equipment	LS	1	$ 150,000.00	$ 150,000.00	
	Installation @ 20%	LS	1	$ 30,000.00	$ 30,000.00	
	Concrete	LS	1	$ 20,000.00	$ 20,000.00	
	Piping and Valves	LS	1	$ 65,000.00	$ 65,000.00	
	Electrical & Instrumentation	LS	1	$ 50,000.00	$ 50,000.00	
	Sitework	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 47,250.00	$ 47,250.00	
				Subtotal	$ 382,250.00	**$ 382,250.00**

Subtotal Excluding NMGRT		**$**	**1,826,250.00**
Contingency	30.0%	$	547,875
		$	2,374,125
Engineering	10.0%	$	237,413
Surveying & Geotechnical	3.0%	$	71,224
Construction Related Services	4.0%	$	94,965
Administration	1.0%	$	23,741
		$	**2,801,468**
NMGRT @	7.4375%	$	208,359
	Total	**$**	**3,009,827**

City of Carlsbad, New Mexico
Wastewater Treatment Facility - Effluent Reuse
Alternative 2 (Phased) - Estimate of Probable Costs
Phase III

Item	Description	Unit	Quantity	Unit Price	Cost	Subtotal
1.0	**GENERAL CONDITIONS**					
	Mobilization	ls	1	5%	$ 87,000.00	
	Bonds & Permits	ls	1	5.50%	$ 96,000.00	
	Demobilization	ls	1	2%	$ 35,000.00	
				Subtotal	$ 219,000.00	**$ 219,000.00**
2.0	**WEST REUSE STORAGE POND**					
	Clear and Grub	LS	1	$ 1,500.00	$ 1,500.00	
	Excavation	CY	4000	$ 15.00	$ 60,000.00	
	Liner	SF	13000	$ 2.00	$ 26,000.00	
	Landscaping	LS	10000	$ 1.00	$ 10,000.00	
	10" Inlet Piping Connection	LF	300	$ 35.00	$ 10,500.00	
	Site Restoration	LS	1	$ 5,000.00	$ 5,000.00	
	Contractor Markups @ %15	LS	1	$ 16,950.00	$ 16,950.00	
				Subtotal	$ 129,950.00	**$ 129,950.00**
3.0	**EAST REUSE STORAGE POND**					
	Clear and Grub	LS	1	$ 1,500.00	$ 1,500.00	
	Excavation	CY	3000	$ 15.00	$ 45,000.00	
	Liner	SF	10200	$ 2.00	$ 20,400.00	
	Landscaping	LS	5000	$ 1.00	$ 5,000.00	
	10" Inlet Piping Connection	LF	100	$ 35.00	$ 3,500.00	
	Site Restoration	LS	1	$ 5,000.00	$ 5,000.00	
	Contractor Markups @ %15	LS	1	$ 12,060.00	$ 12,060.00	
				Subtotal	$ 92,460.00	**$ 92,460.00**
4.0	**REUSE BOOSTER PUMP STATION NO. 2**					
	Pump Station Equipment	LS	1	$ 500,000.00	$ 500,000.00	
	Installation @ 20%	LS	1	$ 100,000.00	$ 100,000.00	
	Concrete	LS	1	$ 20,000.00	$ 20,000.00	
	Piping and Valves	LS	1	$ 65,000.00	$ 65,000.00	
	Building	LS	1	$ 20,000.00	$ 20,000.00	
	Electrical & Instrumentation	LS	1	$ 50,000.00	$ 50,000.00	
	Sitework	LS	1	$ 20,000.00	$ 20,000.00	
	Contractor Markups @ %15	LS	1	$ 113,250.00	$ 113,250.00	
				Subtotal	$ 888,250.00	**$ 888,250.00**
5.0	**IRRIGATION PIPELINES**					
	8" (Distribution Pipelines) PVC including trenching, backfill, compaction & surface restoration	LF	14000	$ 30.00	$ 420,000.00	
	12" River Crossing	LF	1270	$ 120.00	$ 152,400.00	
	Contractor Markups @ %15	LS	1	$ 63,000.00	$ 63,000.00	
				Subtotal	$ 635,400.00	**$ 635,400.00**

Subtotal Excluding NMGRT		**$**	**1,965,060.00**
Contingency	30.0%	$	589,518
		$	2,554,578
Engineering	10.0%	$	255,458
Surveying & Geotechnical	3.0%	$	76,637
Construction Related Services	4.0%	$	102,183
Administration	1.0%	$	25,546
		$	**3,014,402**
NMGRT @	7.4375%	$	224,196
	Total	**$**	**3,238,598**

Appendix G

Community Engagement Presentation

City of Carlsbad, NM
WWTF Effluent Reuse Project

Presentation to:
Water / Sewer Board

May 15, 2014

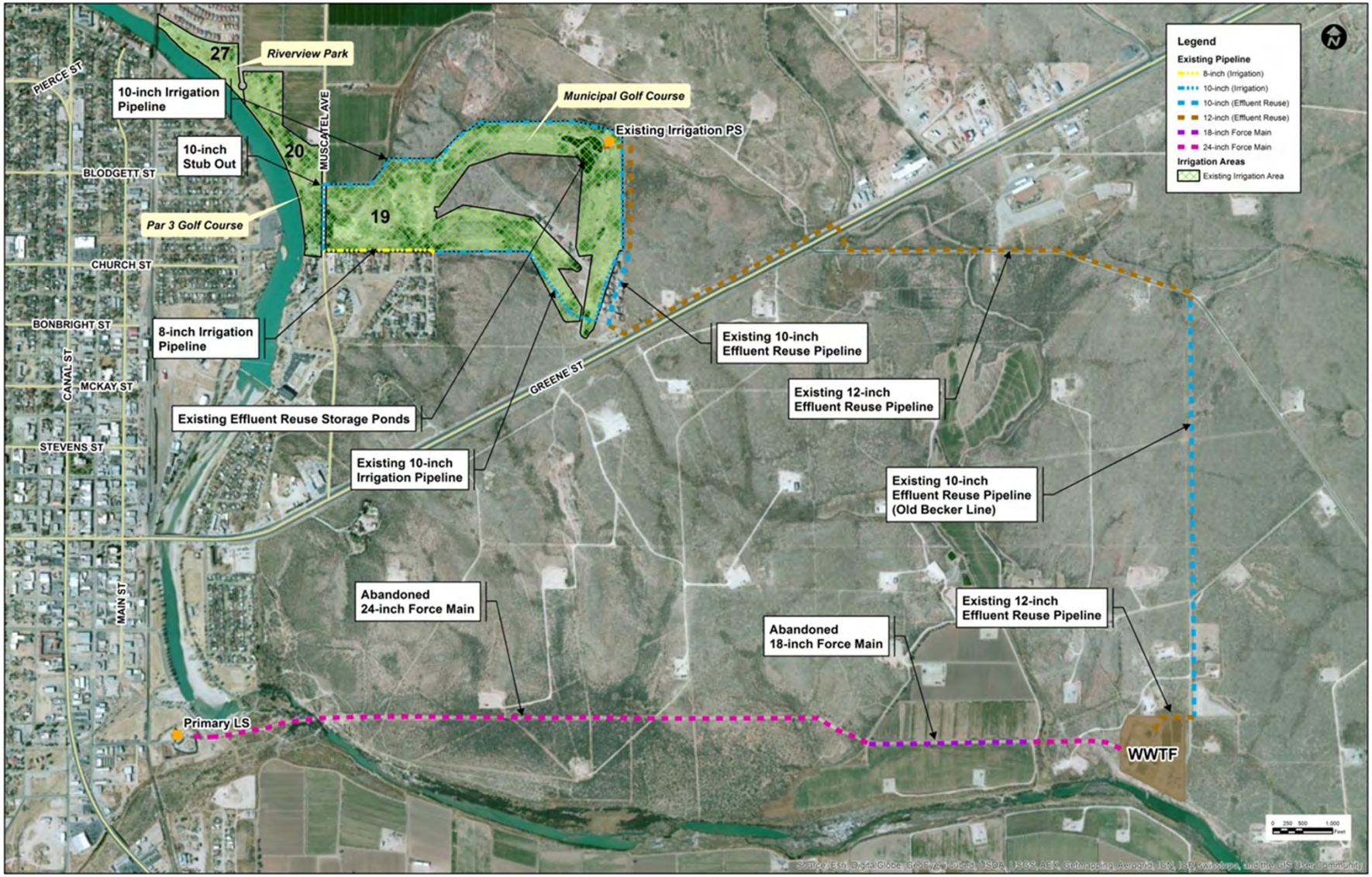
History of Effluent Reuse Program

- Purpose of the program is to reduce the use of potable water for irrigation
- Program Initiated in early 1990's
- Implemented in late 1990's to irrigate the Municipal Golf Course
- Addition of storage ponds, irrigation pump station and irrigation pipelines completed in 2008
- Currently irrigating the Municipal Golf Course, Par 3 Golf Course and Riverview Park
- Pursuing to extending reuse infrastructure to irrigate additional areas

Existing Reuse Infrastructure

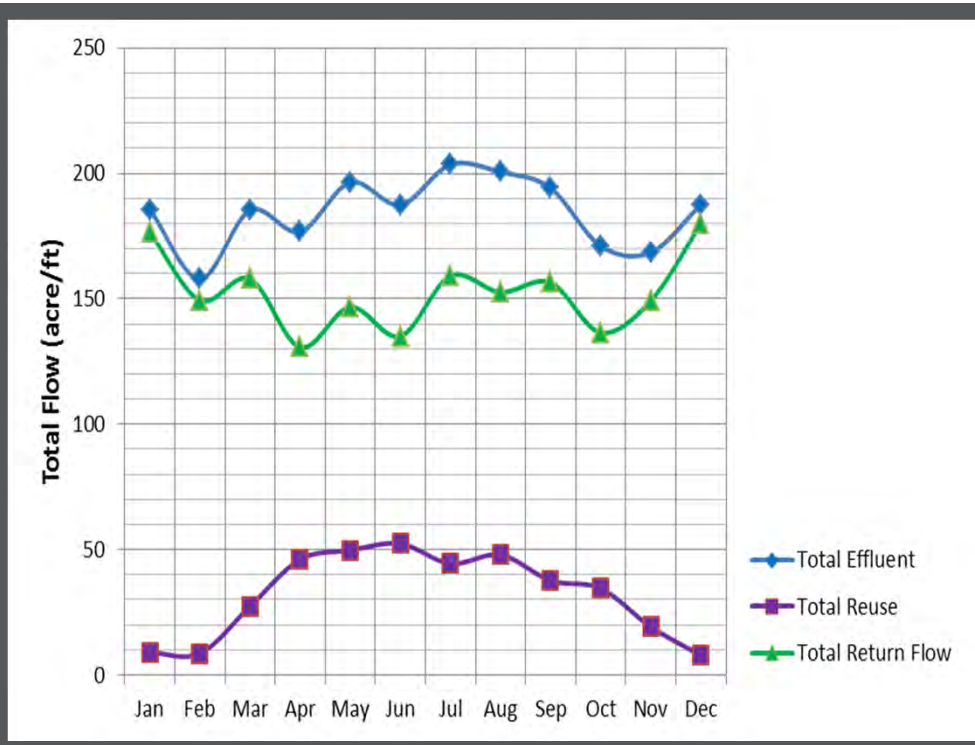
- Wastewater Treatment Facility treats the City's wastewater to meet permit limits required to discharge to the Pecos River and for beneficial reuse
- Reuse pump station at Wastewater Treatment Facility
- Reuse pipeline between WWTF and Municipal Golf Course
- Reuse storage ponds at Municipal Golf Course
- Irrigation pump station and pipelines at Municipal Golf Course

Location Map of Existing Reuse Infrastructure



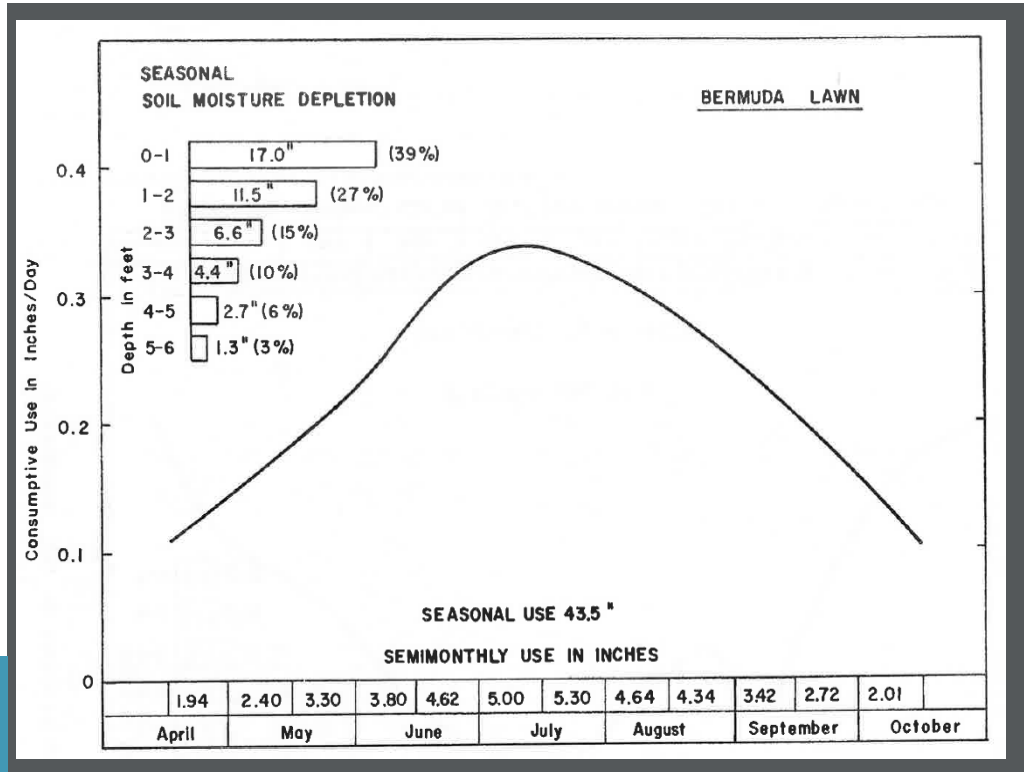
Current Yearly Irrigation and Return Flows

- Average WWTF influent flow ~ 2.0 mgd or 2,215 acre-ft/year
- Current reuse used ~ 385 acre-ft/year
- Return flow to Pecos River ~ 1,830 acre-ft/year
- Required return flow to Pecos River by City's water rights – 1,414.59 acre-ft/year
- Excess reuse water returned to Pecos River which can be used for irrigation ~ 415 acre-ft/year



Calculated Irrigation Demands

- United States Department of Agriculture (USDA) estimated seasonal water consumption for bermuda grass – 43.5 inches/year (3.625 acre/ft per year)
- Peak irrigation demand for month of July - 10.3 inches or 9,000 gallons per acre per day
- Irrigation flow rates based off of peak irrigation demand for month of July



Potential Irrigation Sites

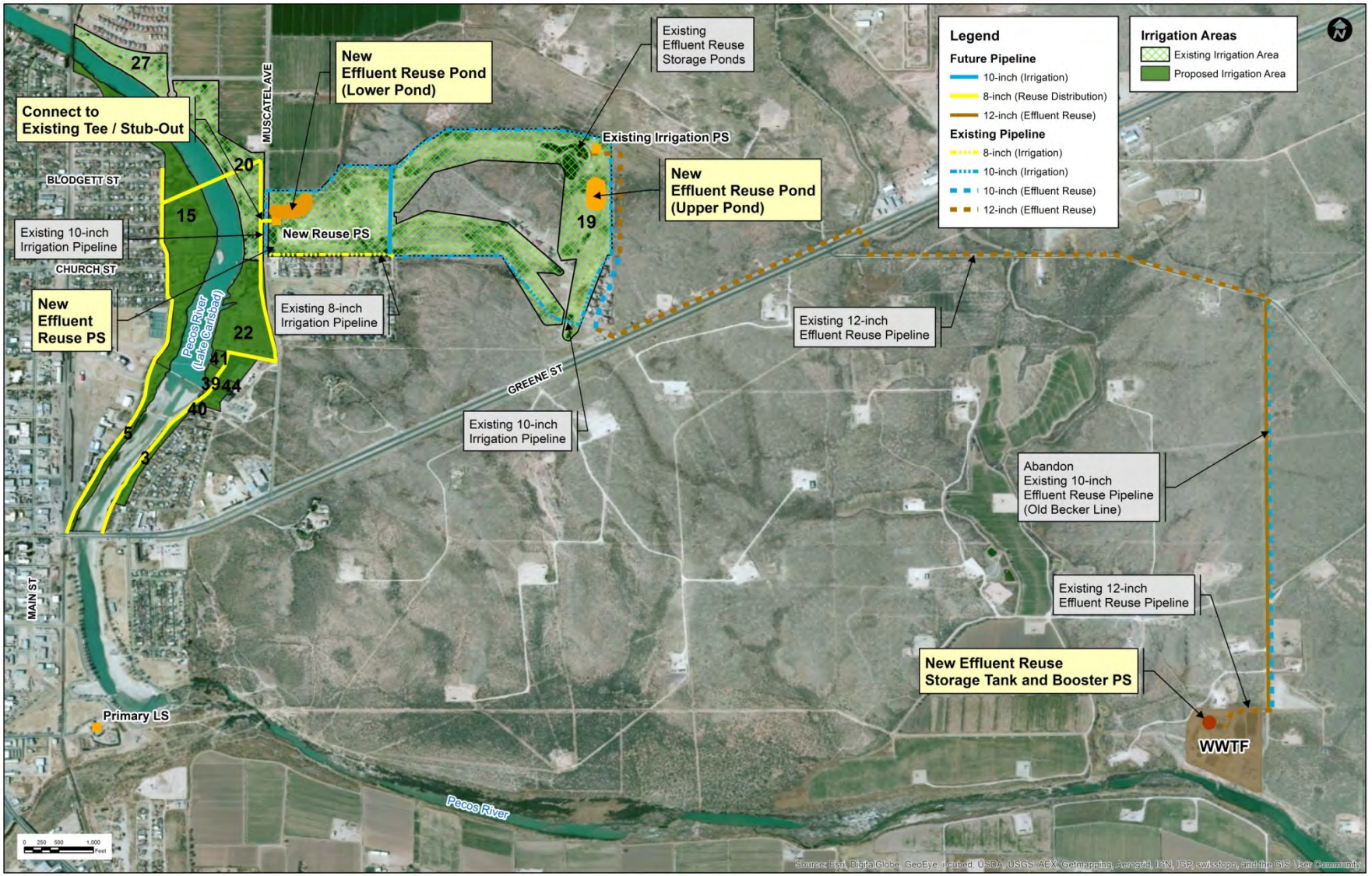
- Municipal Golf Course, Par 3 Golf Course and Riverview Park currently irrigated with reuse water
- City possesses other parks but were not considered due to their size and proximity
- Sunset Cemetery not considered as it does not meet the intent of the reuse program

Key	Irrigation Site
3	Bataan Recreational Area – East
4	Bataan Recreational Area – South
5	Bataan Recreational Area – West
10	Cruz Fernandez Park
15	Lake Carlsbad Recreation Area
19	Municipal Golf Course (irrigated area)
20	Par 3 Golf Course
22	Pecos River Village Recreation Area
24	Plaza Del San Jose Park - North
25	Plaza Del San Jose Park - South
27	Riverview Park
37	MLK Memorial Park
39	Alejandro Ruiz Memorial Park
40	Millennium Park
41	Playground On the Pecos
44	Alejandro Ruiz Memorial Skate Park (Not Irrigated)
45	Carlsbad Cemetery

Alternative 1 – No Action

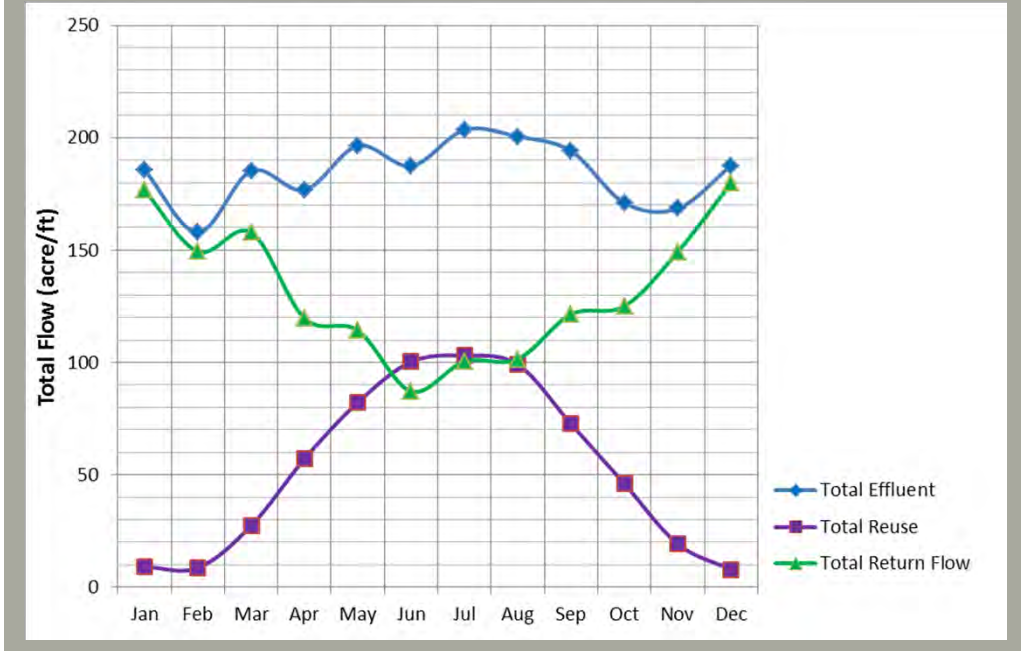
- Required to evaluate a “No Action” alternative
- City would continue to utilize reuse water as currently done
- This alternative does not support the City’s goal to conserve potable water

Alternative 2 – North System

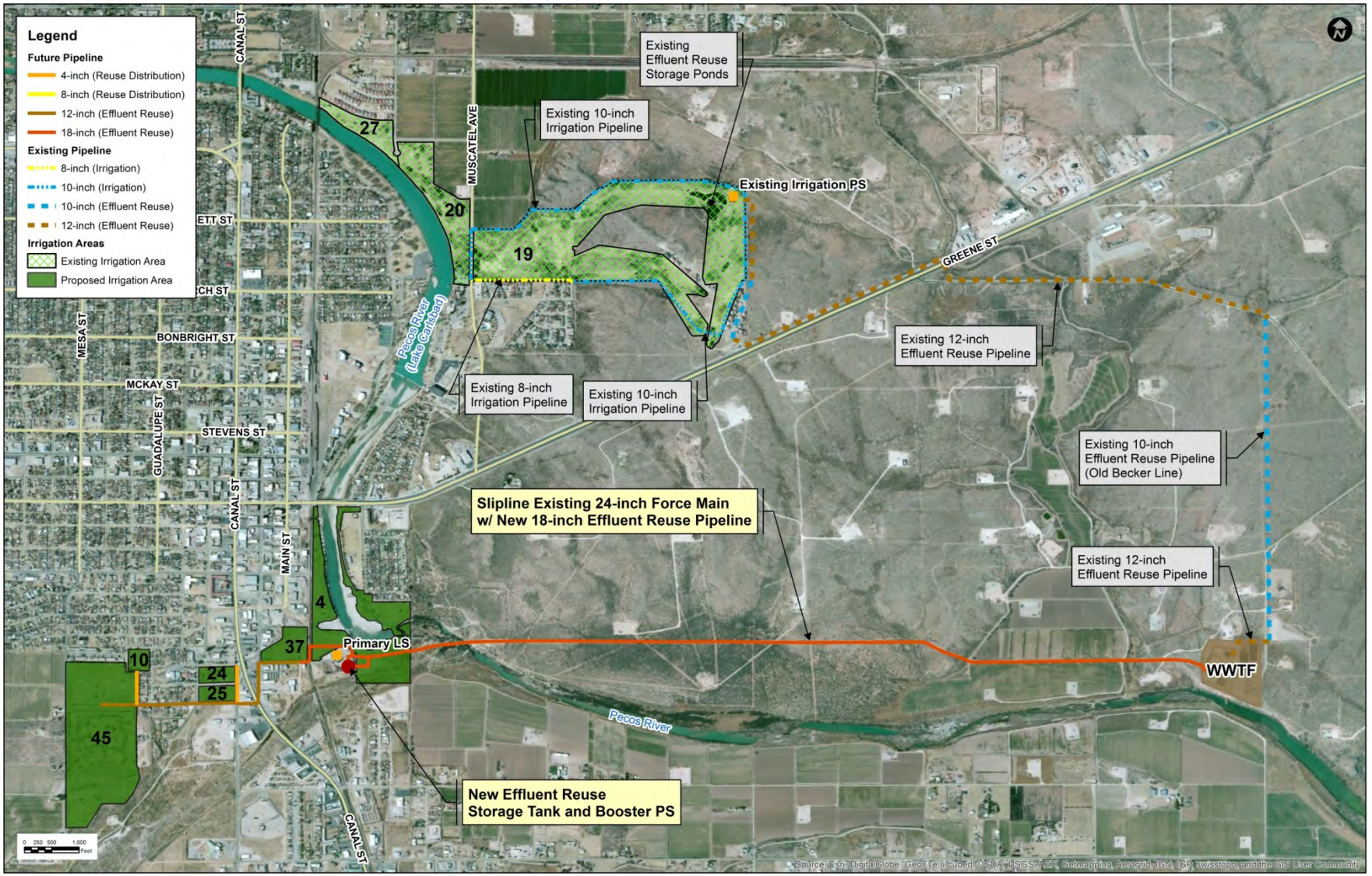


Alternative 2 –North System

- Additional irrigation acreage – 68 acres
- Excess return flow to river ~ 168 acre-ft/yr
- Future potential acreage to include Bataan Recreation Area South – 109.3 acres
- Excess return flow to river ~ 19 acre-ft/yr
- Reuse Infrastructure to include:
  - Modifications to existing reuse pump station
  - New chlorine injection facility
  - New reuse storage tank and transfer pump station
  - Increase size of reuse pipeline
  - New reuse storage ponds at golf course
  - New irrigation pump station, river crossing and irrigation pipelines

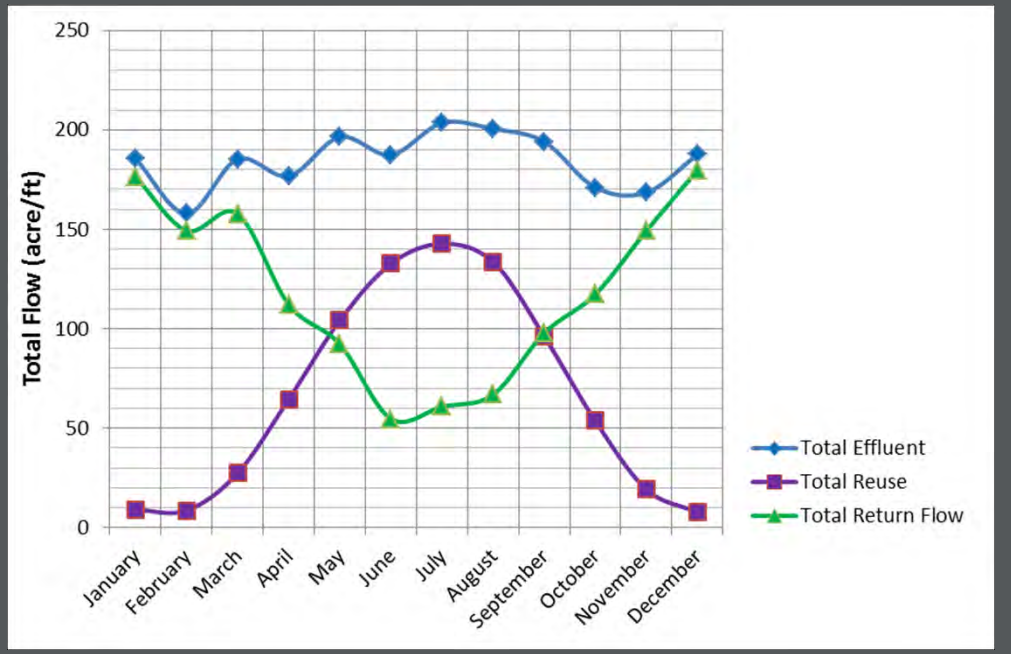


Alternative 3 – South System Map

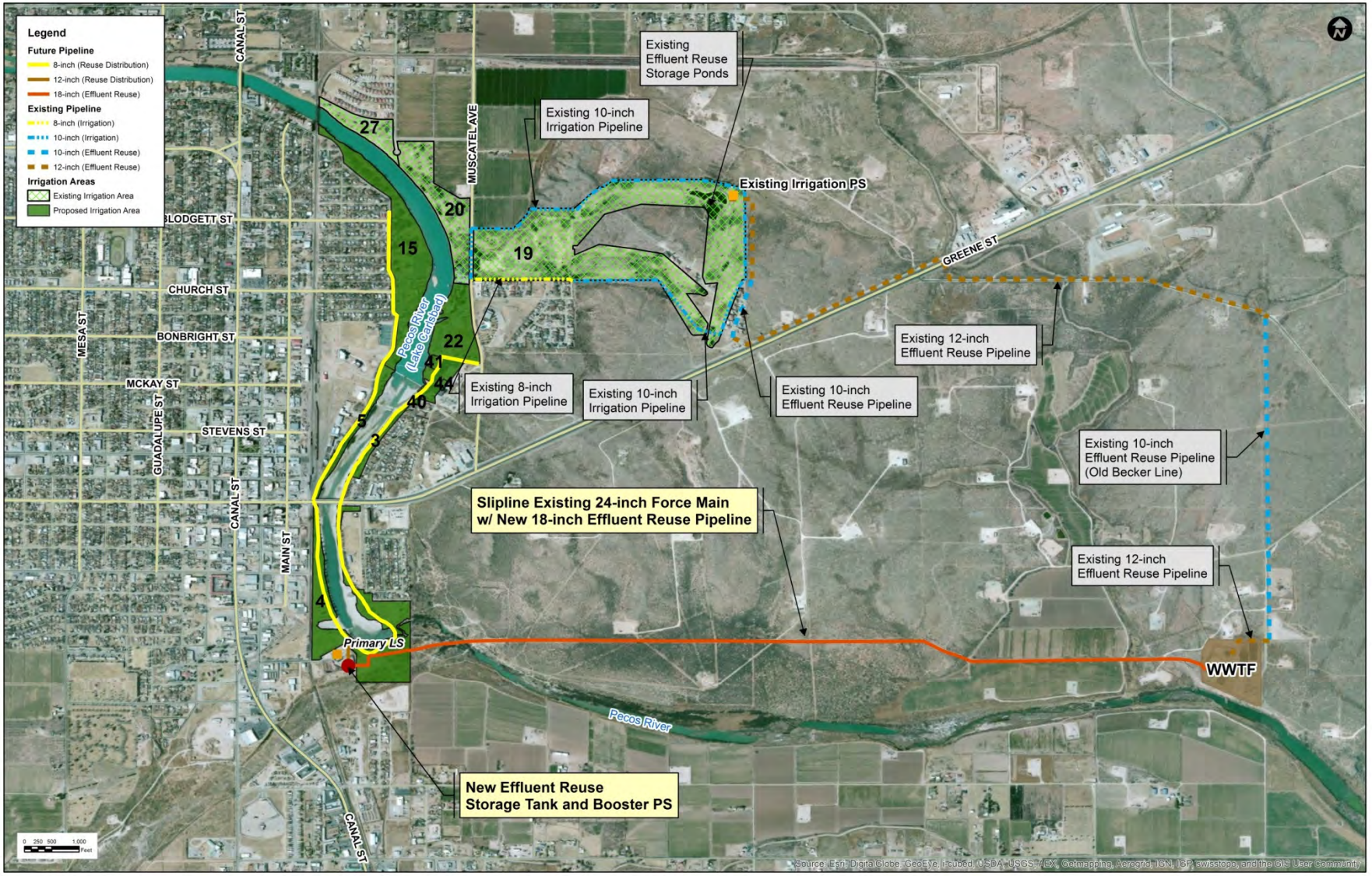


Alternative 3 – South System

- Additional irrigation acreage – 127.6 acres, only enough to irrigate 114.5 acres meaning some smaller parks would need to be excluded
- Reuse infrastructure to include:
  - Modifications to existing reuse pump station
  - New chlorine injection facility
  - New reuse transfer pump station
  - Slipline existing abandoned 24-inch diameter forcemain
  - New reuse storage tank
  - New reuse irrigation pump station and pipelines

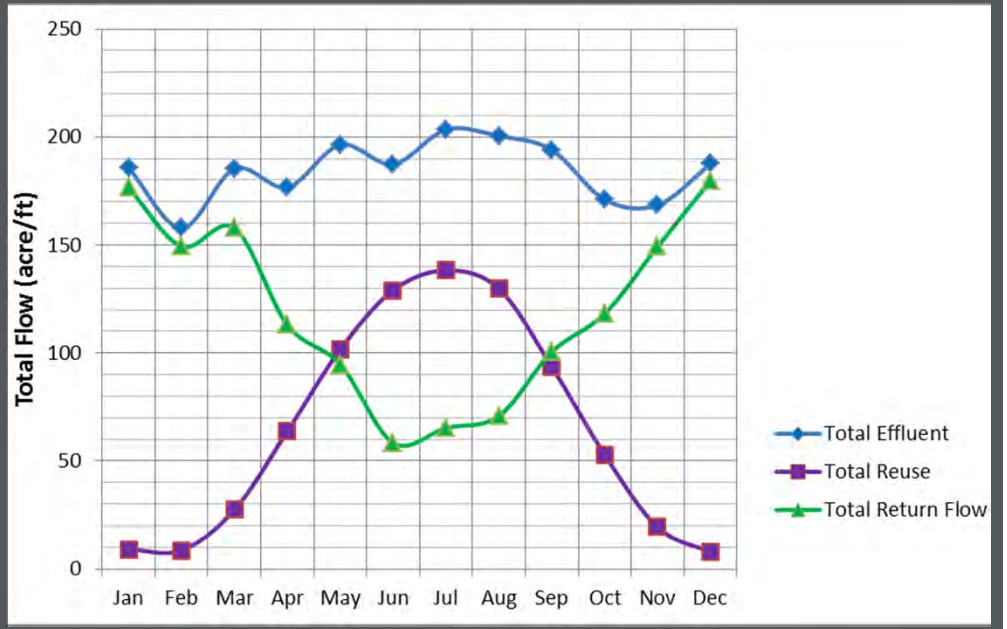


Alternative 4 – Lake Carlsbad System



Alternative 4 – Lake Carlsbad System

- Additional irrigation acreage – 109.3 acres
- Excess return flow to river ~ 19 acre-ft/yr
- Reuse infrastructure to include:
  - Modifications to existing reuse pump station
  - New chlorine injection facility
  - New reuse transfer pump station
  - Slipeline existing abandoned 24-inch diameter forcemain
  - New reuse storage tank
  - New reuse irrigation pump station and pipelines



Alternatives Evaluation

- Based on the evaluations, Alternative 2 – North System is the preferred alternative

Factor	Alternative 1 No Action	Alternative 2 North System	Alternative 3 South System	Alternative 4 Lake Carlsbad System
Capital Cost	10	9	7	8
O&M Costs	10	9	8	8
Improvement to Existing Reuse Infrastructure	0	10	9	8
Sustainability Considerations (Utilizing 100% Available Reuse)	5	9	10	10
Direct Benefit to the Community	5	10	8	10
Construction Phasing	10	9	7	7
Total Score	**40**	**56**	**49**	**51**

Proposed Project

- Phase I – Estimated Probable Cost $1,879,805
  - Modifications to existing ruse pump station
  - Chlorine injection at WWTF
  - Improvements to existing irrigation at golf course
  - Increase size of existing 10” pipeline to 12”
  - Connect Par 3 and Riverview Park to irrigation loop at golf course

- Phase II – Estimated Probable Cost $3,009,827
  - 2.0 MG reuse storage tank at WWTF (sized to include Bataan South Recreation Area)
  - Reuse transfer pump station

- Phase III – Estimated Probable Cost $3,238,598
  - Reuse storage ponds at golf course
  - Reuse booster pump station at golf course
  - River crossing and irrigation pipe lines

  (Flows for Bataan South Recreation Area should be considered)

Return Flow Requirements

- City must return 1414.59 acre/ft per year to the Pecos River
- HDR contacted Office of the State Engineer regarding credit for irrigating with reuse but only applies for flood irrigation
- There is the possibility that the City would not be required to return flow to the river
  - Current daily flow could irrigate an additional ~ 185 acres during peak irrigation season. Total study area is 187.6 acres.
  - Current annual WWTF flow can irrigate an additional ~ 505 acres but would require over 800 acre/ft of winter storage